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THE UNIVERSITY OF ALBERTA

The Implications of Equity Financing on the Size, Structure and Survivability of Alberta Farms: A Case Study

by

© Michael J. McEvoy

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF Master of Science

IN

Agricultural Economics

Department of Rural Economy

EDMONTON, ALBERTA

Fall 1986

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Leonard Bauer
Supervisor

.....

.....

Date Oct 10, 1986

Abstract

The financial crisis in agriculture, arising from high debt loads, low incomes and falling asset values, has produced interest in alternative methods of financing agriculture. Among the alternatives proposed has been the concept of equity financing. Problems related to the implementation of equity financing include a lack of information on the part of investors and farmers about the nature of returns in agriculture, a lack of financial intermediaries, lack of control over the investment by the investor and a reduction in control by the farmer.

The objectives of the thesis were to test the viability of equity financing in terms of the level of returns; to test if different business structures affect the returns and to explore the nature of policy changes and financial intermediation that may be required.

Financial and physical data representing a nine year period beginning in 1976 were collected. The data were used as the basis for the development of a spreadsheet model that allowed different business structures to be modelled. The control case was a sole proprietorship and the test cases included a crop share lease, a fixed rate lease, a general partnership and a corporate farm.

Analysis of the results indicated that the level and nature of agricultural returns are not likely to be very attractive to non-farm investors. From the viewpoint of the farmer major changes in structure, control and philosophy are implied in the concept of equity financing. Further research into the use of the Capital Asset Pricing Model in agriculture is recommended in order to better determine investor response. The impact of different economic conditions from those represented in the data also needs assessment.

Acknowledgements

The production of this thesis has been a little like mating elephants ... it has involved a lot of noise and has taken two years to produce results! Many innocent bystanders have assisted in many different ways and I am indebted to all for their help. Some deserve special mention.

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I am grateful to Dr. Len Bauer who acted as my supervisor and advisor. Without Len's help in mastering the intricacies of double-entry accounting, I might still be "driving in wedges". The use of a T-Account

in lieu of the proverbial hickory stick has much to recommend it. Dr. Mel Lerohl acted as my advisor while Dr. Bauer was away; I am grateful for his 'hand-holding', and for his comments and suggestions as a member of my committee. Dr. Glen Mumey's help in pointing out and improving weaknesses in the work was invaluable. The thesis is leaner and richer as a result of his efforts. My only regret is that I did not involve Dr. Mumey earlier. Any errors or omissions remain my responsibility.

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1. Introduction and Background

The circumstances of the seventies and the early years of the eighties have produced a problem in farm finance. Agriculture is a highly capital intensive sector of the Canadian economy in which the effects of inflation, high interest rates and tight money, falling land prices and declining equity have been particularly evident. The availability and source of capital are a concern due to the effects of borrowed capital on the size, structure and survivability of farms.

Traditionally, agriculture has relied on owner-operator equity capital obtained through savings, off-farm investments and retained earnings. The shortfall between capital requirements and available equity was filled by debt capital from a variety of sources. Availability of debt capital is a function of the borrower's equity (security), management skills, repayment capacity and risk preferences. During the seventies however, these criteria tended to be distorted by other economic factors.

Land values rose rapidly. Financing these values using debt capital, in many cases produced situations where the income generated by the land was insufficient to service the debt and provide for acceptable returns to operator equity. These loans, because of the difference between the nominal interest rate and the rate of capital appreciation in agriculture, had a low or negative real cost. The cost of borrowed capital was an important consideration in the increased quantity of borrowed capital which was demanded. With a decline in the rate of asset appreciation, high rates of interest, and due to the risk and uncertainty of agricultural production and marketing, debt carrying capacity decreased. In other words, some farms appear to be at or near

the limit of debt that can be repaid and still provide for a residual to the equity holder.

The consequences of these changes in farm finance were not readily apparent. By the early eighties the combination of record high interest rates, falling farm incomes and declining land values had produced a stressful situation within the industry. Indicators of the severity of the situation are the rising number of farm failures (Klein and Barichello, 1985), increased calls for a moratorium on farm foreclosures, the formation of the 'farm survivalist' movement and the establishment of the Federal Task Force on Agricultural Finance.

The erosion of farmers' equity has resulted in a re-evaluation of the situation in farm finance by both lenders and borrowers. Lenders are emphasizing repayment capacity as well as security in their loan portfolios. Borrowers, having experienced the cash flow difficulties arising from high interest requirements, among other factors, have developed a reluctance to incur additional debt.

The general level of equity in agriculture is about 85% across the sector and is about 35 points higher than the typical equity levels found in other small businesses (Farm Credit Corporation, 1985).[1] This may be the result of several factors. First, the nature of agricultural production and marketing is such that incomes tend to be more variable than other businesses (Brinkman, 1981). Fluctuations in income can be minimized by diversification and superior management but in large part are beyond the scope of the individual farmer to predict or control. As

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[1]The 6000 sample farms on the survey were drawn from the 1981 Census. Certain farms were excluded including institutional farms, farms in Indian reserves, community pastures, farms with reported sales of less than $2000 in 1980, farms in marginal areas with little or no agricultural activity and farms which were part of large multi-farm operations owned by large corporations.

a means of minimizing financial risk the farmer therefore chooses, or is forced, to hold additional equity. Second, farm income takes two distinct forms. The first is current income from farm operations. The second arises from changes in the value of assets over time.

While the overall level of equity in the sector is high, analysis of equity levels by age groups, representing stages in farm development, shows that much of the outstanding farm debt has been incurred by new and expanding farmers (FCC, 1985). Young and expanding farms require higher levels of debt to compensate for a lack of equity which increases risk exposure of the firm. The effect of high debt levels is compounded by the state of the economy. Under circumstances such as the seventies, the effects were in many instances beneficial. The eighties, however, have presented new circumstances to which the responses of the seventies may be inappropriate.

A. Need for the Study

The current problem in agricultural finance is not new. Many times in the past attention has been directed to the same symptoms as are apparent in agriculture today. High levels of total capital investment, high equity requirements, low returns on equity and high interest rates have all been cited at various times as being serious problems within agriculture. In response to these concerns, various programs have been implemented to support the level of income for the farmer and his family. Not the least of these programs has been subsidization of interest rates on borrowed capital for investment in agriculture.

The dilemma facing new farmers and expanding farmers, as with any business, is how to obtain the required capital at a manageable cost

without increasing risk exposure to an unacceptable level. From the lenders' viewpoint the problem is how to provide the needed capital, obtain adequate security and repayment terms and, in the case of commercial lenders, provide for a return on their shareholders' investment. Finally, from a social perspective, the concern lies in establishing policy that will attempt to satisfy the goals of society in a number of areas. These include concerns about land conservation and tenure, rational resource allocation and maintenance of the family farm business with an acceptable level of income for the farm family.

Traditionally agriculture has been treated as a special case of a small business. The basic unit of business organization has been the family farm. These farms are organized as single proprietorships, partnerships or as family controlled corporations. The predominant form of business type has been the sole proprietorship and while some changes away from this standard are becoming more prevalent, these changes are largely induced by perceived taxation advantages available to corporations and partnerships and in response to inter-generational transfers. The fundamental concept of the 'family farm' is widely held. While various interpretations of the concept can be found which differ slightly from each other three common elements are usually found. Minimum size of a family farm is determined by economic viability; maximum size is set by the availability of labor from the farm family; and the farmer must be free to manage the farm independently. Typically the last condition has been interpreted as requiring ownership of the factors of production. Traditional credit policy has evolved with the objective of maintaining the family farm. A dominant feature has been the subsidization of credit, in both public and private sectors, by the

treasuries of the federal and provincial governments. Changes arising from modifications in policy or from proposals to alter existing financial arrangements are likely to meet with opposition if they involve major changes to the size and structure of the farm. Proposals which will require that the market determines the cost of capital used in agriculture may also not be widely acceptable. Solutions must therefore be considered in the context of this social and political framework.

The above discussion has outlined briefly the troubled state of affairs in agricultural finance. The problem may be defined as:

> Traditional methods of financing agriculture are inadequate and are introducing undesirable changes to risk levels, size and structure that affect farm survivability.

Symptoms of the problem are numerous. While rising farm failure rates, falling incomes and erosion of equity are problems in their own right, they are apparently compounded by use of traditional methods of farm finance. The severity of these problems may be lessened and perhaps prevented in future by the development of financial arrangements which will provide for additional equity in agriculture.

Solutions to the problem will require alternative methods of capital acquisition. Comparison of the effects of traditional and alternative financing methods on the survivability of the farm business should give some indication of the preferred choices. Research into a number of alternative debt instruments has been or is currently being carried out. Despite the attractiveness of some of the alternatives being developed, the fact remains that they are debt instruments. Making these instruments attractive serves to encourage the accumulation of debt and to further increase risk to the borrower.

Little work however, has been done to explore the potential for equity financing of some of the capital needed in agriculture. If the industry cannot sustain existing debt under current economic conditions then either the level of debt needs to be reduced, interest rates must be lowered or the value of the assets is too high. Given the nature of the returns to agricultural assets, the subsidized cost of debt and the disruptive impact of large-scale reductions in asset values, the options that need to be explored seem to be in the area of equity investment to reduce the level of debt in agriculture. Returns to equity are a residual return however, and will only occur after all other claims against income are satisfied. This means that labor, borrowed capital and management all have priority claims on income. Because equity returns are a residual they involve more risk and therefore command a higher return than other sources of capital. A fundamental question arises. If the industry is incapable of servicing existing debt, at a lower cost than equity capital, how then can equity be attracted and adequately compensated? This study attempts to evaluate the conditions under which equity financing may be feasible and the implications of equity financing under various economic conditions.

B. Objectives and Hypothesis

The objectives of research into equity finance are to test the implications of equity financing with respect to riskiness and profitability for both the investor and the farmer and to contribute to improved farm management through reduction of risk exposure. In addition, the effect of equity financing on farm size and structure, and on the survivability of farms, will be examined. Finally, the types of policies and institutions needed to facilitate these methods will be explored to assess their possible impact. The research will attempt to

identify the benefits as well as the associated costs of equity investment. For example, the re-allocation of risk is a beneficial effect but involves a cost to the farmer as a partial loss of control of the farm business may be required.

The hypothesis to be tested is that:

> Use of external equity in the financing of farm businesses can have beneficial effects on financial outcomes by reducing risk and increasing both survivability and growth rates. External equity may be incorporated in a number of forms which may affect the outcomes.

The long-run nature of investment in agriculture and the interrelationship between the macro-economy and the agricultural sector requires that the hypothesis be tested using a simulation model. A model to evaluate the effects of alternative financial debt arrangements is developed to simulate a representative grain and livestock farm. The model as specified incorporates a variety of parameters that affect farm growth and survivability. These include production, marketing, taxation, personal withdrawals, investment and financing. Information about the rate of return to the farmer investor in comparison to the non-farm investor will be generated in order to evaluate each investment method. A number of trials using the same streams of income but changing the method of equity financing will provide some indication of the performance of the various alternatives.

Any proposal to provide equity financing to agriculture will require the farmer to relinquish his claim to a portion of his business. Given that the 'family farm' is the preferred method of organization these types of proposals may prove to be unacceptable. One of the biggest potential obstacles to any proposal for non-farm equity investment in agriculture is the lack of a means of communication between those who need the capital and those who have the capital. The agriculture industry is composed of large numbers of small, dispersed

farms which represent a wide variety of enterprise types and combinations. The costs of locating potential equity investors may be too great for the average individual farm business to undertake and there is a lack of expertise in the area. Some form of financial intermediary is likely needed to develop the prospectus, find the investor and market and administer the proposal. From the investor's viewpoint the mechanisms that need to be established to protect his right to know that his investment is not being mismanaged are an important consideration. Identification of possible mechanisms and the associated costs will also form part of this study.

C. Organization of the Study

The first part of the study has briefly introduced the problem and discussed the background from which the need for the study became apparent. Chapter 2 reviews the relevant literature and Chapter 3 outlines the methodology of the study in more depth. Chapter 4 provides the results of the study. Chapter 5 contains a discussion of some of the policy and institutional considerations associated with equity financing. Chapter 6 contains the summary and conclusions.

2. Literature Review

This section begins with a discussion of income measurement using an accounting versus an economic approach. The intent is to show that asset value changes are a part of farm incomes and should be measured on an annual basis if reasonable decisions about continuing production are to be made. The next part deals with a large body of literature related to the use of borrowed capital in agriculture. It therefore implicitly involves equity considerations. Very few studies specifically address the applicability of external equity funding to agriculture. This section briefly reviews those studies. Because this study uses a computer simulation as a vehicle for analysis, a brief review of some of the literature related to farm firm modelling and simulation is also provided.

A. Agricultural Finance

Income Considerations

The issue of accounting versus economic income has been the subject of debate recently and is of importance to this project. Economic measures of income typically apply the concept of opportunity cost in an attempt to value the factors of production employed in the generation of income. Accounting measures, on the other hand, do not consider 'unpaid' factors of production and are calculated after expenses occur. Aukes (1985) suggests that much of the current difficulties in agriculture are rooted in "inappropriate economic and financial recommendations to farmers and policymakers because of mixed 'economic' and 'accounting' analyses." Aukes makes use of Hicks' distinction between ex post or accounting income, and ex ante income. Ex ante income is related to the expected values of future cash flows and

asset value changes over a time period. Ex post income is concerned with the determination of income based on how much can be removed from the entity while still leaving capital intact. Hicks defines the difference between ex ante and ex post income as windfall and notes that the discrepancy may be negative or positive. Windfalls are therefore considered to be surprise deviations from the expected values and may arise from a variety of sources. Any systematic differences must be due to errors in the estimation of the expected values rather than from economic considerations. Aukes takes exception to the inclusion of asset value changes, a part of ex post income, in measuring farm income. Rather than removing only windfall gains from the income stream, Aukes treats all changes in asset prices as windfalls and therefore refuses to consider asset value changes as income. The determination of land value, in most cases, explicitly involves the capitalization of expected future benefits. Expectations of future benefits may be changed by changes in any number of parameters and will ultimately appear in the marketplace in the value of the asset. The revaluation of asset values according to the change in the basis for calculating that value is only partly windfall but may also include good management in purchasing or developing assets. Asset value changes are therefore included in income calculations in this paper.

Aukes also raises the issue of double-counting in attempting to demonstrate that asset value changes should not be considered as part of income. On assets that have a finite life, the inclusion of asset value changes is not double-counting as long as the revaluation process considers the depreciation of the asset. The approach used in this research follows this principle in the calculation of fixed asset adjustments. The procedure is described in more detail in the next chapter.

Land however, is a perpetual asset on which no depreciation is charged. If land is capable of generating $100 in rent this year and every year in the future; and if the discount rate is 10% the land will have a market value of $1000. The expected future benefits of owning that land consist of the present value of the rent in the next year, $91, the present value of the rent in the year after that, $83, and so on until the value of $1000 is approached. If the owner consumes only the $100 of income in the current time period, and if nothing occurs to alter his expectations for the future, then he will have another $100 to consume at the end of the next period. No double counting has occurred from the inclusion of expected future benefits in current income.

Aukes' concern with income measurement seems to be based on several notions. First, errors in expectations of future benefits can occur and asset values may not perform as expected. Secondly, debt obligations contracted on the basis of current market values, the summation of discounted future values, may cause difficulty if asset values decline. The fundamental concern does not appear to have a basis in economics. The role of management would be redundant if certainty about the future was the norm. The distinction between good managers and bad is the ability of the good manager to gather information, formulate a plan and implement it. The acceptance of responsibility for decisions is an important functon of management. Economics exists as a tool to try and aid managers in their decisions. The difficulty in which some managers find themselves today is more likely a result of their decisions based on the best available information at the time, rather than the mixing of economic and accounting measures of performance as suggested by Aukes.

Debt Proposals

Much of the literature in the area of agricultural finance has focused on debt financing. Studies reporting on the effect of concessional credit terms, estimations of the demand for credit, the impact of managerial ability on repayment capacity, repayment capacity under conditions of risk and uncertainty and estimations of the structural implications of various credit arrangements have been published. Because borrowed capital constitutes only a portion of the total capital invested in agriculture these studies, while concerned with the return to borrowed capital, also implicitly involve some effects on the equity holder as well. To simplify the discussion of agricultural finance, the approaches to the problem can be categorized on the basis of risk and the allocation of risk.

Agricultural finance can be divided into three categories on the basis of where risk is allocated. First, under traditional debt financing the equity holder assumes the risk of income variability arising from production and marketing strategies. But income in agriculture also includes capital appreciation or depreciation. Under debt financing the risk associated with unforeseen asset depreciation is also assumed by the equity holder. The lender does not directly share in the risk from either income variability or asset depreciation but assumes only the risk that the loan will be in default. Security taken minimizes this risk in most cases. The second category includes pure equity financing under which all risk is assumed by the equity holder and finally, the third category includes some combination of debt and equity financing. Table 2.1 indicates the double nature of leverage and the relationship between the return to assets, the return to equity and the cost of debt.

Table 2.1 **Leverage Effect on the Return to Equity for a Return on Assets of 10%**

Debt-to-Asset Ratio in %	INTEREST RATE ON DEBT			
	5%	10%	15%	20%
	Return to Equity			
0	10.0	10.0	10.0	10.0
10	10.6	10.0	9.4	8.9
16	11.0	10.0	9.0	8.1
20	11.3	10.0	8.8	7.5
30	12.1	10.0	7.9	5.7
33	12.5	10.0	7.5	5.1
40	13.3	10.0	6.7	3.3
50	15.0	10.0	5.0	0.0
60	17.5	10.0	2.5	-5.0

Aukes (1983) identifies and evaluates a variety of modifications to traditional financing instruments. Alternatives include accrued interest mortgages, variable amortization plan mortgages, indexed mortgages and shared appreciation mortgages. These modifications, with the exception of the shared appreciation mortgage, are intended to reduce risk by tailoring repayment to variable cash flow arising from risky production and marketing activities.

The accrued interest mortgage (AIM) is, as Aukes points out, no different than a conventional mortgage that has not been serviced in an orderly manner. Conversion of accrued interest to principal can result in a higher outstanding balance and increased debt servicing requirements later in the loan amortization period. This appears to be the major detriment to the instrument. Aukes suggests that two modifications could effectively reduce the detrimental impact of interest deferrment and increasing balances while retaining the advantage of improved flexibility.

> "If current period interest costs are deferred due to cash shortages and added to the loan balance, cash surpluses of a subsequent period could be used to reduce the loan balance. ... A reserve cash balance could be established at the outset of the loan term to prevent increases in the outstanding loan balance in those periods when interest costs were not met from the variable cash flow. This adaptation would make the AIM function much like the variable amortization plan." (Aukes, p. 18)

Under simulated farm conditions this instrument was not very successful in contributing to increased farm survivability. It also appears to increase risk to the lender by allowing for increased loan balances.

The variable amortization plan (VAP) is essentially a buffer fund arrangement. Under the proposal the borrower agrees to set aside a cash reserve in periods when net cash flow exceeds loan repayment requirements against those times when net cash flow is inadequate to meet loan repayment requirements. Essentially the VAP is a set aside of equity as insurance against income volatility. It therefore may be workable, and indeed attractive, for those farmers in a position to set aside a portion of their equity into an interest bearing account. In many respects however, the VAP appears to be no different in actual effect than the currently existing situation in agriculture. As previously noted the level of equity in agriculture is considerably higher than that found in other small businesses. Farmers appear to choose to retain equity as a hedge against income fluctuations. In his research Aukes found that use of an instrument such as the VAP improved farm survival rates by 5% over conventional mortgage instruments.

An indexed mortgage (IM) is reviewed and evaluated by Aukes but, as he notes, the terms of the instrument are not well specified at present. The concept involves use of a fixed rate of interest to represent the 'real' rate of interest and an index of principal to reflect the impact of inflation. Aukes suggests that

> "by apparently transforming current period cash costs normally associated with inflation induced increases in market rates into

> future costs associated with adjusted (increased) loan balances, it would be hypothesized that the IM would alleviate debt servicing problems associated with changes in interest rates on borrowed capital." (p. 18)

Under the conditions simulated in Aukes' study the IM, as specified, improved survival rates considerably over the conventional mortgage. Growth rates however, tended to be lower than for conventional financing. Over 90% of the surviving firms exhibited growth rates of 10% or less. Conventional financing, on the other hand, had over 30% of the surviving firms exhibiting growth rates in the range of 10-13%. It appears therefore, that the IM offers improved survivability at the expense of rapid expansion. The difficulty in specification of the instrument however, makes these results difficult to interpret.

A similar proposal for indexation of agricultural mortgages was recently outlined by the Farm Credit Corporation and contained in the Federal Budget tabled on February 26, 1986. A commodity-based index rather than an index of 'real' interest rates is proposed. It is suggested that such an index would match debt payment requirements to cashflows and thereby reduce risk to the borrower. Aside from the difficulties which are likely to arise in the calculation and application of a reliable index reflecting variations in prices by region, this version of the IM suffers from the same shortcomings as that discussed by Aukes. It also appears to introduce further uncertainty to farm management decisions by matching debt repayment schedules to highly variable farm commodity prices.

The shared appreciation mortgage (SAM) is an instrument that appears to have promise but only under conditions of rapid appreciation in land values. Essentially the instrument is a combination debt and equity instrument which carries a reduced rate of interest. In return for receiving a lower rate the borrower agrees to surrender, to the

lender, a portion of the capital appreciation in the asset purchased. Had the SAM been in place under conditions such as the mid-seventies the rate of return would have been quite attractive. At the same time, according to the results of Aukes' study, the rate of survival would have been enhanced in comparison to all other alternative methods with the exception of the IM method. However, given the incomplete specification of the IM and the change in economic conditions, it is unlikely that the same results could be obtained were the experiment to be repeated under today's conditions.

A similar review of alternative debt instruments was recently completed by the Federal-Provincial Task Force on Agricultural Finance (TFAF) (1984). The TFAF established five criteria for evaluation of alternative mechanisms. These include stability, implementation, acceptability, cost and risk. In addition to the instruments contained in Aukes' report the TFAF report also discusses a graduated payment plan and a split (shared) risk mortgage, among others. The TFAF concluded that the VAP, split risk and fixed rate mortgages as well as some other proposals showed promise. The AIM and graduated payment plan were considered to be unacceptable to commercial lenders due to high risk. Presumably this would make them unattractive to borrowers as well. "The major risk is that the loan value could eventually exceed the asset value." The committee determined that shared appreciation mortgages and indexed mortgages had fundamental difficulties.

> "The problem with shared appreciation mortgages is that farmers are unlikely to be willing to give up a portion of the appreciation, and if a government agency were to provide such an instrument it is likely that farmers would lobby to have the lender's share of the appreciation returned to the borrower. There is insufficient information to properly assess indexed term loans" (TFAF, p. 41).

The instruments discussed by both Aukes and the Task Force are debt instruments which have been designed for use in the future based on the

experience of the seventies. At present it is not apparent what the long term effects of these proposals might be if conditions in the future are not comparable.

Another set of proposals deals with the problem of excess debt relative to repayment capacity. These include the restructuring of existing intermediate and long term debt by increasing the amortization period, interest buy-down and principal write-down. Knutson and Richardson (1984) evaluated each of these alternatives using a simulation model and estimated the probability of survival under each alternative. A highly levered farm was restructured under each of these alternatives and the simulation was run. Results were compared to a base farm and to the highly levered farm before restructuring. The highly levered farm had only a 50% chance of surviving the ten year planning period. Debt restructuring improved the probability of survival to 60% and allowed for an increase in farm size of three percent. The interest buy-down and principal write-down provisions increased the probability of survival to 92% and 100% respectively. Both allowed larger growth in farm size by about 15% relative to the highly levered farm. In comparison to the base farm, however, all three methods produced worse results. The base farm had a debt/asset ratio of 34% for long term debt and a 65% intermediate ratio. At the end of the simulation the base farm was 13% larger than under the next best of the three alternatives.

Equity Proposals

The introduction of additional equity to agriculture has been suggested by a number of authors in a variety of ways. Barry, Hopkin and Baker (1979, p. 451) point out that

> "financial management in agriculture has focused on the management of debt capital under the assumption that farmers could generate sufficient equity capital from retained earnings, capital gains, inheritance and gifts. This assumption has been consistent with the structural characteristics of agriculture in which farming operations are largely controlled by individual farmers and farm families. However, these features are subject to change, as illustrated by the substantial leasing of land, which separates ownership and control, and by the production of some commodities by non-proprietorship business arrangements relying heavily on outside equity capital. Even growth oriented proprietorship firms or partnerships may be under pressure to expand faster than they can generate equity capital from within the business. Alternatively, some highly leveraged operations may wish to attract additional equity in order to reduce leverage and thus high financial risks."

Brake (1983) also suggests that

> "as capital needs increase farmers may not be able to generate sufficient equity from retained earnings. Several possibilities for obtaining additional equity exist. Perhaps additional nonfarmers or farm heirs from a previous intergenerational transfer will consider owning land. Shared appreciation mortgages are another way of enticing capital into agriculture. Partnerships or limited partnerships with a non-farm partner may become realities and, with increasing farm size, incorporation could become more common. Leasing will also likely increase in popularity as a means through which farmers may obtain the use of a resource without owning it."

Scofield (1972) discusses the introduction of non-farm equity into agriculture. He raises concerns about "possible adverse competitive effects that the entry of non-farm capital may have on traditional farm firms" which arise from "tax-loss" investments by outside investors in high tax brackets. Scofield points out that "an in-depth analysis of the total amounts of such capital... and its possible impact on the family-owned businesses has not been made." The financial arrangements discussed include the use of general and limited partnerships as well as issuance of common stock in corporations and the use of private venture capital. Scofield discusses the advantages and disadvantages of each.

The limited partnership is attractive to an investor because of the limitation of liability to the amount of the original investment. The lack of involvement in management by the investor is attractive to

the farmer and may also be an attractive feature for the investor. Disadvantages of the limited partner arrangement arise, according to Scofield, from the difficulty in determining the market value of the partnership interest and from a lack of liquidity.

Common stock and private venture capital placements offer the advantages of increasing available equity for expansion or reduction of debt. Problems arise from a lack of appropriate financial information transfer from the firm to the investor and potentially high transaction costs. Additionally, the tax treatment afforded income generated by a corporation is different, both in the hands of the firm and in the hands of the investor, from the tax treatment of income in the hands of a partner.

Scofield (p. 40) identifies a number of criteria by which investors evaluate a risk investment. They include:

> " Potential for leveraging equity capital;
> Potential for deferral of taxes on ordinary income;
> Opportunities for converting ordinary income into capital gains;
> Effectiveness of the investment as a hedge against inflation;
> Potential after-tax returns in comparison with other venture capital investments available.
> Some weight may also be given to non-economic considerations such as the novelty or uniqueness of the venture and the personal satisfaction and prestige that may be associated with it."

Penson and Duncan (1981) review some other alternatives including leasing of farm assets and discuss various factors which influence the demand for leased capital. The difficulty which some sellers may have in withdrawing equity at a fair market price, due to high interest rates and slack demand, combined with a desire for a hedge against inflation, is viewed as a motivator in the expansion of farmland leasing. The authors go on to list three factors which they consider likely to attract outside investors to farmland purchase and lease arrangements.

> "First, inflation has caused investors to view physical assets as a more desirable store of value than financial assets. ... Even though a farm recession and high interest rates may

> momentarily reverse that pattern for 1980, it is likely to be re-established in the remainder of the decade" (p. 86).

The second factor is the attractiveness of farmland investment in the U.S. to foreign investors. Legislation in place in most parts of Canada preclude this as a major determinant of demand for land to be used for leasing arrangements. Finally the authors suggest that if returns to agriculture increase, due to increased demand for foodstuffs, to a level comparable with alternative investments then

> "farmland may become increasingly attractive to individual investors, investment groups and pension plans. This will be particularly true if - as expected - current returns to farming increase markedly and if farmland continues to effectively shelter equity from inflation" (p. 87).

While the returns to land may be determined by these factors the returns on land are determined by the capitalization rate at which land is priced. Current economic conditions would indicate that the situation envisioned by Penson and Duncan has not developed and that these factors as stimuli to investment in farmland are considerably less important now than they appeared to be in 1981.

Penson and Duncan also suggest that off-farm equity is a reasonable alternative to debt finance. The use of equity from retiring farmers and others is seen as encouraging entry into agriculture by helping to overcome the high costs of entry. Also equity funding helps farmers to share business risk with others. "The judicious use of off-farm equity capital is a way for farmers to gain an ownership interest in assets needed for an efficient operation without assuming the risks associated with full ownership." Problems to be resolved include problems with poorly defined risks and returns often linked to an individual's management ability, problems in locating prospective investors, reluctance on the part of investors to assume a minority position in a closely held farm unit and a lack of management control by

the investors under some arrangements. In addition the assumption that retiring farmers should for some reason be willing to accept lower rates of return than other investors does not appear to be reasonable. It may be that retiring farmers, having better knowledge of the risks in agriculture and having accepted those risks while actively farming, will be prepared to invest in agriculture. The expected returns however should reflect the riskiness of the investment.

The encouragement of increased equity financing in agriculture will require new sources of funds. Presently in Canada the sources of funds for long term investment in agriculture are overwhelmingly dominated by the lending agencies of the federal and provincial governments (FCC, 1983). Often the funds obtained from these sources bear a subsidized rate of interest. The difference between the market rate and the subsidized rate is capitalized into the value of land over time and results in even greater demand for funds. The proposed "agri-bond" (TFAF, 1984; Ontario Ministry of Agriculture and Food, 1984) is designed to induce retiring farmers to reinvest in agriculture and is one vehicle that may provide a source of funds to meet the demand for debt capital. The concept is dependent on the inclusion of significant tax advantages. Boehlje and Reinders (1983) explore similar policies in attempting to determine the impact on land values of income tax provisions designed to encourage investment in land. Lins (1981) examines the potential for life insurance companies as a source of funds and concludes that, depending on the financial instrument employed, financial risk can be either increased or decreased. Boehlje (1981), in an article examining the role of non-institutional lenders in agriculture, concludes that non-institutional credit is an important source of financing but is inversely related to institutional lending depending on interest rates, rate of return and the availability of

funds to institutional lenders.

> If market conditions enable institutional lenders to charge competitive interest rates, generate reasonable rates of return, and have adequate funds to serve agriculture, then non-institutional lending will decline in importance. If institutional lenders encounter difficulties servicing the needs of farmers, then institutional lending - particularily personal and intrafamily loans - will increase in importance.

He points out that as more farms incorporate and use debentures (debt instruments) and stock in their capital structure the use of intra-family debt will increase. The use of intra-family debt in unincorporated entities is discussed. It is suggested that many of these loans are unsecured and that the interest rates borne by such financing appear to be below market rates.

The application of non-traditional methods and sources of funds to finance agriculture has implications in the areas of agricultural policy and structure. The issue, as discussed by a number of authors (Babb; Boxley; Lins 1979; Lu), revolves around the arguments for and against the retention of the 'family farm' concept in agriculture. It involves policy considerations in the areas of land tenure arrangements, technology and research as they affect capital requirements, ownership and control of resources and income distribution.

B. Types of Business Arrangements

There are three basic options available to businesses needing equity capital. These take the form of different business arrangements and include the traditional sole proprietorship, general and limited partnerships, and incorporation.

The sole proprietorship is the most common form of farm business organization and accounts for over 87% of farms in Western Canada (Klein and Barichello, 1985). These farms use equity accumulated by the owner through retained earnings, off-farm employment, inheritance and

unrealized capital gains. Equity available is normally not sufficient to meet capital requirements and is therefore levered to some degree by the use of debt capital. Experience and research indicate that the minimum level of equity needed to successfully establish a viable farm business is likely in the 60% range. If the proprietor is unable to acquire that level of equity the firm is likely to fail due to the high cash flow requirements to service debt. At this stage further borrowings of debt capital are not likely to be available and the owner will be forced to consider other business arrangements.

Partnerships are the second most common form of business organization found in agriculture and account for 8.6 percent of Western Canadian farms (Klein and Barichello, 1985). A partnership is said to exist when there is a "type of organization in which resources are pooled to produce income which is shared by the partners." (Alberta Agriculture, 1980). The partnership agreement need not be in writing if "in the absence of an express agreement the people have behaved as partners. This implied partnership can be very important for legal and tax consequences of being declared a partnership may affect the viability of the business."

There are two types of partnerships - general and limited. In a general partnership each partner is liable for the actions of the other partners. In a limited partnership however, the liability of the limited partner is restricted to the amount of the initial investment. Some of the requirements of a limited partnership are that the limited partner cannot be involved in the management of the firm without losing limited liability status; there must be one or more general partners; the name of the limited partner cannot appear in the firm name and the limited partner is entitled to a share of income generated by the firm.

Partnerships offer the advantages of pooled financial and physical resources and may offer income tax advantages such as income splitting, deferral of capital gains or losses, and the ability to block or forward average income. Disadvantages include difficulties in collapsing the agreement without triggering capital gains tax, complex tax accounting, progressive tax rates, unlimited liability of the general partner and difficulties which may arise due to personality conflict between partners or from changes in goals and objectives. Partnership agreements offer the potential to bring additional equity into the farm firm and are probably best suited to the kinds of family arrangements commonly found. It is possible that outside equity can be introduced to the firm in other ways, such as leasing land, joint ventures or through vertical integration. These are a "grey areas" however and each case is subject to individual interpretation as to whether a partnership exists.

Of the commonly found business structures the corporation has considerable potential for the inclusion of investor equity in farm businesses. Only 4.3 percent of farms in Western Canada are incorporated and these tend to be large scale operations. The number of incorporated farms is increasing as the average level of capital invested and income rises. One of the apparent motivations for incorporation of a family farm is found in the potential tax benefits that can be realized. The corporation is regarded as a separate legal entity and differs from a sole proprietorship or partnership because there is no progressive taxation on income. In addition the tax rate is lower for small businesses. A business qualifies for the lower small business rate providing that it does not advertise its shares for sale. Combined federal and provincial tax rates for small businesses range from 18% to 27%. At the time of writing the rate in Alberta is 20%. Other corporations which do not qualify for the small business exemption are

taxable at a rate of 47%.

In addition to the tax benefits available the corporation offers limited liability to the shareholders, flexibility of transfer and permanence. In addition, there is considerable flexibility in the manner in which income is distributed by the corporation to its owners. Large income tax advantages can be achieved. For example, under current tax regulations a corporate shareholder, having no other source of income, can receive approximately $40,000 in dividends without paying income taxes.

Among the disadvantages are the increased annual operating costs associated with complex accounting requirements, taxation of any capital gains or investment income at the higher corporate rate, restriction of losses to corporate losses only with no set-off against other income and difficulty in transferring assets out of the company on a tax deferred basis (Alberta Agriculture, 1984, p. 40).

While most of the impetus for incorporation of the family farm arises with potential tax benefits other advantages exist. The ability of the corporation to raise capital through sale of shares has not been exploited to any great extent in an agricultural context. Additional equity, attracted through more extensive application of this aspect of the business model, may result in more favorable debt ratios, less risk because of better residual returns and increased economies of scale.

A final variation of farm business organization is the non-farm corporation controlling farm assets. While only 0.3% of Alberta farms are controlled in this fashion the concept does present some interesting possibilities. Elofson and Miller (1959) outline a scheme for outside investors and low-equity farmers to participate in an agricultural holding company. A similar proposal has been made by Ashmead (1986). The company would invest in a number of farms operating various enterprises

in a number of locations. A farm management advisor would be made available to assist in record-keeping and accounting and other management activities. The farmer-operator of each farm unit in which the equity investment company has an interest would be paid a salary, as a return to labor, and would participate in the equity earnings of share capital as well. Over time, as his equity accumulates, the farmer could acquire control of his farm unit by purchasing shares in the corporation controlling his farm or by an outright purchase of the assets he is farming on behalf of the corporation.

Both of these proposals appear to provide a mechanism to ease entry requirements into agriculture by allowing low-equity beginning farmers to gradually acquire both the experience and equity to successfully establish a viable farm business. Ashmead's proposal specifically (but presumably Elofson and Miller also) suggests procedures under which farmers in financial difficulty, as well as lenders in control of repossessed farmlands, can participate in the corporation. Restructuring of farm balance sheets by sale of fixed assets to the corporation, debt retirement and a lease-back of land appear to offer potential for increasing farm survivability. Provisions in the shareholders agreement would allow the farmer to use shares, which he received as partial payment for his land, as a downpayment on any subsequent repurchase of the farm.

Ashmead's proposal that lands controlled by such a corporation be leased to farmers at a fixed rate for long periods requires further study. The suggested rate of 5% does not appear to be realistic and will likely not attract investors other than lenders looking to dispose of costly foreclosure lands. Guarantees by the government would appear to be a necessary condition. Additionally, because there appears to be an option to purchase contained in the proposed lease agreement, it is not

clear whether lease payments would be a deductible expense for tax purposes, or whether the lease is in fact an agreement-for-sale precluding deduction of payments. In the first instance, the value of the leased asset would not appear on the balance sheet but it may appear under the terms of an agreement for sale. In either event, extra caution will be required in the interpretation of financial statements from businesses using such an agreement.

While the details of Ashmead's proposed corporation are not completely clear there appears to be potential for difficulties arising from the method of calculating the market value of land. The suggested method of determining market value is the capitalization of net operating income by a 'risk-free' capitalization rate. This approach does not consider the contribution to market value of such factors as location, financing, value of buildings and the supply and demand for land. It is also unclear whether there would be some provision to review either the lease rate or the market value to which it applies.

C. Simulation and Modelling

Economic situations in general, and agricultural economics in particular, are difficult to model. Complex inter-relationships between the biology of the plants and animals, climatic considerations and the personal preferences and skills of the individual manager combine to produce outcomes from management decisions that are difficult to analyse let alone predict. Simulation models, as a representation of the real world, can assist in the evaluation of economic decisions. The time requirements in simulation are often shorter than the requirements of the actual situation. This can allow for evaluation of a large number of alternatives in a relatively short period of time and which would otherwise be impossible.

Morgenthaler (1961) states that "the term 'simulation' like 'system' is sometimes a source of confusion due to the lack of accepted terminology. In its widest sense 'to simulate' means to duplicate the essence of a system without actually obtaining the reality". Naylor, Balintfy, Burdick and Chu (1966) define simulation as a two-phase operation "that involves setting up a model of a real situation (system) and then performing experiments on the model."

Wright (1971) claims that a problem with definitions such as those above is that "they allow all research involving models to be classified as simulation. Thus, techniques such as budgeting and linear programming could be classified as simulation in that they involve models of real systems." Wright discusses the validation and verification of simulation models before inferences about reality can be drawn. A distinction is made between validation and verification.

> "A model is validated in relation to the purpose for which it was constructed, wheras a model is verified in relation to the absolute truth. Validation is not concerned with the correctness of a model but rather whether it is effective or suitable for a particular purpose." Further "the critical test in validation is whether the model leads to better decisions than can be obtained by using other techniques" (p.27).

The second phase in simulation is experimentation.

> "The objectives of experimentation with simulation models in management oriented studies will usually be of the following types:
> 1. to compare alternative courses of action;
> 2. to estimate the response of the system to changes in the level of a single input;
> 3. to explore the response surface, generated for different combinations of input levels, and
> 4. to estimate the input combination required for an optimal or near optimal level of output" (Wright and Dent, 1969).

Phillips (1971) raises concerns with the use of historical data. According to him

> "either a random or judgement (i.e. 'representative') sample from the historical data is used. Neither of these approaches has much to recommend it: the historical data represent nothing more than a sample from a much longer term process than has been

> observed, and the result is that unnecessary restrictions are placed on the generality of findings, based on the performance of the simulation model."

Phillips goes on however, to state that historical data are important as a basis for the stochastic generation of variables and as an aid to validation of the model. In his opinion "once these functions have been fulfilled the historical data are of no further use or value." (p. 43).

A summary of a variety of issues related to the modelling of the farm firm is contained in Baum and Schertz (1983). Various authors discuss the implications of agricultural policies as they affect the behaviour of the farm manager, the modelling implications of incorporating risk into the model and the effect of legal and tax considerations on the specification of the model. Looney (1983) presents an overview of the various forms of ownership and demonstrates that each form has different tax implications. Halbrook (1983) in a discussion of Looney's paper claims that the choice of ownership structure occurs infrequently. While this may be true in the context of a majority of 'family farms', an investor contemplating an agricultural investment opportunity is likely to be very interested in the form of ownership and his rights under that form of ownership. Halbrook concludes by noting that

> "Since the agricultural finance literature lags the general finance literature by about ten years, the researcher can make much progress in modelling agricultural firm decision making by simply drawing from the work that has already been done in the general finance profession" (p. 151).

The next chapter will outline the methodology for the study and will incorporate some of the work done in the finance field.

3. Methodology

The literature review presented in the previous chapter discussed a variety of proposals and issues related to both debt and equity financing of agriculture and provided a brief overview of some of the issues in simulating agricultural financing options. The development of a methodology to evaluate proposed options is the subject of this chapter.

A. Case Farm History

A simulation procedure was used employing a representative farm model specified on the basis of a series of financial statements. Data which form the basis of this model were obtained from CANFARM records for the period 1971 to 1985. The subject farm consists of 480 acres in Central Alberta. The primary enterprises are a farrow-finish hog enterprise in combination with cereal cropping. For the most part, crop acres have been used in the production of feed grains for use in the hog operation. Surplus or higher quality grains are sold and some feeder cattle are also finished.

The case farm is a successful, long-standing operation in which a considerable amount of equity has accumulated. The financial records provided indicate the financial outcomes of management decisions made over the period by the owner. By virtue of the fact that this farm was still operating at the end of 1985, these decisions must be judged to have been 'good' decisions insofar as the survival of the business is concerned. The records provide indications of the production, marketing, planning, investment, financing and consumption activities which occurred on this farm and which resulted in its present status. These activities occurred as a result of decisions made at the time in the context of the economic environment of the time. It should be noted

however, that the level of management skills in production, finance and marketing exhibited on this farm are considerably better than typical.

B. Specification and Validation of the Model

The simulation model uses the LOTUS 123 electronic spreadsheet to replicate the basic accounting relationships in the flowchart shown in Figure 3.1. Output from the model consists of a balance sheet, a statement of revenue and expenses, a cashflow statement, an income statement and a series of financial ratios. Examples of each of these financial statements are contained in the Appendix.

The simulation model used is an accounting model[2] originally intended for use as an aid in the analysis of investment alternatives by generating pro-forma financial statements. Input and output from the model was in a monthly format and the planning-horizon of the model did not extend beyond three years. Initial modification of the model consisted of restructuring both the input and output to accommodate both the annual format of the data and the extended number of years. Data entry on an annual basis, as opposed to a monthly basis, sacrifices some reality in the within year timing of cash inflows and outflows. In a modelling context this may reduce the costs of borrowing operating capital. Only annual shortfalls will be financed rather than monthly deficits. The alternative of dividing annual figures by twelve, in the hope that this would approximate monthly cashflows, was judged to offer little in the way of additional realism and was therefore not done.

The closing balances as of December 31, 1976, for each of the items on the balance sheet are the opening balances for the analysis of the case farm. Cash contributions received from the owner are shown as

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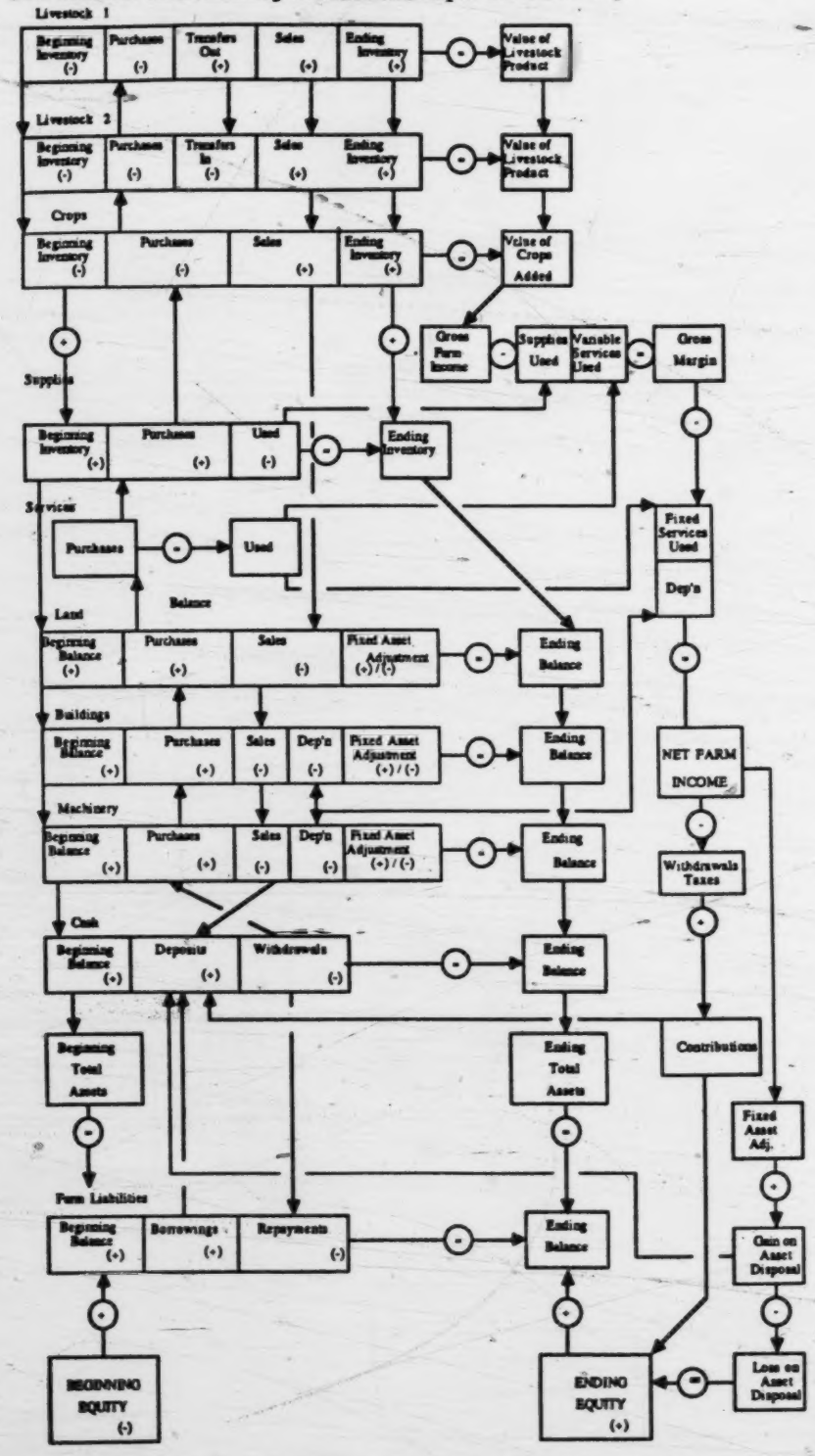
[2]The simulation model used here is an adaptation of a monthly cashflow forecasting electronic spreadsheet developed by Bauer and McFadzean.

Figure 3.1 Basic Accounting Relationships in Farming



Source: Farm Business Analysis Manual, Canfarm

cash inflows on the cashflow statement and purchases of the various assets are recorded as cash outflows. The acquisition of inventories of product and supplies on hand as of December 31, 1976 are recorded under the appropriate headings on the statement of revenue and expenses. Product inventory changes are considered as an adjustment to the revenue side while supply inventory changes are included as an adjustment to expenses. Using the available information the model generates a series of financial statements for the year end which then become the opening balances for the following year and the trial period.

In addition to the financial statements provided, the model internally transfers funds from current account to an interest bearing account if the balance in the current account exceeds a specified maximum. If the current account balance falls below a specified minimum the model redeems term deposits, if available, or acquires an operating loan. Maxima and minima and interest rates on the various loans and term deposits are established in a notes and specification section in the spreadsheet. Historic interest rates were used in the simulation.

Other features contained in the model account for depreciation of buildings and machinery. Staight-line depreciation is used in the calculation of net income and capital cost allowance is used in the calculation of taxable income. Asset values on the balance sheet are on a current market value basis. Depreciation is charged as an expense. The fixed asset adjustment is the difference between the undepreciated book value and the market value in one year, and the closing balances in those accounts in the succeeding year.

The second major area of modification to the model was the addition of a tax module. Each of the alternatives to be tested has advantages and disadvantages to offer in the area of taxation of income and involves specific tax treatment of income earned. This appears to be

especially true for income arising from investment in a corporation where it is possible, under some circumstances, to shelter a considerable amount of income from income taxes. While this research is not intended to focus on the income tax aspects of the various alternatives, the taxation procedures in the model are both somewhat complex, and based on assumptions that warrant further explanation.

The tax module consists of a subroutine to calculate the business investment tax credit (ITC) on fixed asset purchases and to adjust the balances in the fixed asset accounts; a subroutine to calculate the maximum available capital cost allowance (CCA) and a subroutine to optimize the amount of CCA claimed to take advantage of any available ITC. Given the amount of operating income, the form of the business and, where applicable, the personal deductions of the owner, the maximum amount of CCA may not need to be claimed. It is desirable however, to report sufficient taxable income so that the tax payable is just equal to the amount of any ITC available. Effectively, this reduces the tax liability to the provincial tax calculated as percentage of the Basic Federal Tax. In years where income is sufficiently high both the maximum CCA and the maximum ITC are claimed. In other years the unused portions of CCA and ITC are carried forward by adjusting the ending balances in the asset and equity accounts.

The personal exemptions for the farm investor are calculated assuming that he is married, has two dependent children and has no other sources of income. All other available deductions, such as the basic charitable deduction and the interest deduction, are taken if available. The non-farm investor is assumed to have other sources of income which combine to place him in a 30 percent marginal tax bracket. Taxes payable by this individual within the model are based only on the marginal income he would receive as a result of his investment in the farm. Given

the possibility that some of the tax management strategies may be more advantageous to the investor in the higher tax bracket, the model assumes that all tax management decisions are made by the active farming investor. Consequently, the outcomes of these decisions may be biased in his favour.

C. Data Considerations

The data used in this study were presented in the form of annual statements and initially consisted of CANFARM records for the period 1971 to 1985. The years 1971 to 1976 consisted of output from Version 2 of CANFARM. Reconciliation of accounts from year to year, and even tracing transactions within years, was virtually impossible. For a variety of reasons, but primarily due to the failure of Version 2 to conform to generally accepted accounting principles (GAAP), these years were excluded from the data series.

Version 3 of CANFARM was introduced in 1976. It incorporated a double-entry system of accounting and was in accordance with GAAP. A humourous 'history' of CANFARM contained a parody in biblical style of the 'commandments' on which Version 3 was based. To quote from The Scriptures According to Canfarm the specifications were:

> "For each transaction there must be submitted two parts and one part shall be called debit and the other part shall be called credit and these two shall be equal.
>
> There shall be continuum levels so that one farmer may account for his entire farm and another may account for his goats separately from his swine.
>
> That which the farmer submitteth unto thee, the same shalt thou list back. And thou shalt further do a reckoning of the farmer's assets and of the farmer's liabilities, and of his losses, and thou shalt give these statements unto him and many more."

While the manner of presentation may be humourous the sentiments expressed adequately summarize the changes which resulted in a

considerably improved system. Available data for the study were therefore restricted to output from Version 3 for the nine year period from 1977 to 1985. These records were entered into the model and were used in the verification and validation of the various routines and subroutines in the model. Each years output from the model was compared to the CANFARM record on which it was based and any inconsistencies were noted and corrected.

At this stage the output from the model was a duplicate of the CANFARM data. Each transaction within the model was classified as a debit or as a credit in an account and was offset by a corresponding transaction as a credit or debit in another account. The double-entry features of CANFARM which leave a 'paper trail' of transactions are duplicated in the model and allow reconciliation of accounts between years as well as within years. A set of financial statements for the case farm were generated from the model with assets valued on a cost basis less accumulated depreciation. A second run, with assets at market values, provided the starting point for the specification of the simulation model.

The simulation model differed slighty from the CANFARM duplicate. Maximum and minimum amounts for cash balances are specified. Cash was allowed to accumulate in the current account up to the maximum specified and the surplus is then transferred into an interest bearing term deposit. If the cashflow statement indicated a deficit, which caused the current account to fall below the specified minimum, the model redeemed any available term deposits. If no term deposits were available, cashflow deficits resulted in borrowing transactions in an operating loan account. An upper limit for operating credit was established by the criteria that equity must exceed 20 percent and there must have been positive cash flows in the preceding two years. In other words, the farm

business was allowed to borrow operating capital as long as there was sufficient equity even though cashflows in previous years had been negative. It was only when both conditions were simultaneously satisfied that credit was cut off. A credit policy such as this would not be found in the current economic environment but represents the typically liberal lending policy of the seventies. A prudent farm manager, faced with eroding equity and having suffered a series of cash shortages, may well have decided to liquidate the business, or take other financial measures to increase his probability of survival prior to suffering a failure as specified here.

Cases involving debt capital were assumed to meet the requirements of the repayment schedule. Loans were amortized over a 25 year period with a fixed rate of interest. Interest rates used were historic for both term and operating lines of credit. Any shortfalls in cash created by the requirements of the debt repayment schedule were removed according to the procedures outlined above.

Valuation of labor supplied by the farm investor presented a problem in attempting to compare one business form to another and in calculation of the return to equity. Labor earnings, in all cases, were based on wages reported paid to hired farm labor (Statistics Canada, 1985). In the corporate and partnership cases this series of withdrawals took the form of a salary paid to the managing partner or shareholder. An allowance for labor was made in the sole propietorships. Returns to equity for the farm operator are net of this return to labor in all cases and are therefore a return to capital only.

D. Application of the Model

The initial step in the application of the model was to change the ownership of the farm as of December 31, 1976. The 'sale' price of the farm was the market value of the fixed assets and inventory on hand as of the sale date. As previously discussed the new owner was assumed to be married, with two dependent children and no off-farm income. An important assumption was that he was considered to have the same high level of management skills as the previous owner. Therefore, with the exception of revenue generated by off-farm investments and accumulated term deposits, and expenses related to the financial structure of the farm, all other revenue and expense items remained the same as in the actual case. The new owner was assumed to have sufficient resources to purchase the farm at the various levels of equity specified and to have $20,000 in cash to contribute toward the first years operating expenses.

Preliminary results indicated that large cash surpluses were accumulated in the term deposit account. In some instances the cash balance at the end of the trial period exceeded $250,000.00. Interest earned on these cash balances represented as much as one-third of net income for that year. Not surprisingly, years in which income earned from investments was highest corresponded with those years in which interest rates reached a peak. These years also coincided with years in which net farm income declined. Consequently, failing farm incomes were offset by high levels of 'non-farm income', in the form of interest on investment, and obscured the returns earned directly from the investment in the farm. The level of withdrawals were increased by linking withdrawals to expected cash requirements for the next year and were determined as a function of the previous years cash expenses. A minimum cash balance was arbitrarily set at $20,000.00 plus 50% of the previous years expenses. Any cash over this minimum was termed surplus and

removed from the business entity by distribution to the owners in the form of withdrawals or dividends. The result of this change was a substantial reduction in the balances in the cash accounts. The results obtained using the modified model were more directly attributable to farming activities rather than 'non-farm' investment income.

Each of the cases generated a stream of income from current operations and income from asset value changes. The stream of benefits to the owners is the annual cash flow (withdrawals) and the gain or loss in equity from the beginning of the period to the end of the period. Equation 3.1 represents the cashflow component algebraically:

Equation 3.1

$$CF_t = W_t + TaxL_t$$

where: CF_t is the annual cash flow to each investor;
W_t is the withdrawals made in each period and,
$TaxL_t$ is the tax which is paid on labor allowance.

The withdrawals distributed to each owner are in proportion to their ownership share in the business. Equation 3.1 is modified for each alternative business structure to reflect shares. Each modification required is discussed subsequently.

The cashflows represented in Equation 3.1 are calculated on an after-tax basis. In order to isolate the after-tax earnings of capital, and to maintain comparability with the corporate farms in which the owner is paid a salary, an allowance for operator labor was deducted from net income in each of the proprietorship, partnership and leasehold cases. The TaxL term in Equation 3.1 represents a 'refund' of taxes paid by the individual due to the addition of the labor allowance to taxable income and the resulting higher taxation rate.

The annual return to equity is calculated by solving Equation 3.2 for 'i' when NCF is set to zero.

Equation 3.2

$$0 = NCF_t = -C_{t-1} + CF_t/(1 + i) + SV/(1 + i)^n$$

where: NCF_t is the discounted net cash flow to each investor;
C_{t-1} is the initial capital outlay;
SV is the ending value of the assets and,
i is the discount rate (the internal rate of return).

Returns for the entire period (1977-1985) and intermediate returns (i.e. 1977 to 1978, 1977 to 1979 etc.) are obtained from Equation 3.3:

Equation 3.3

$$0 = NCF = -C + \sum_{t=1}^{n} CF_t/(1 + i)^t + SV/(1 + i)^n$$

where: NCF is the discounted net cash flow to each investor;
C is the initial capital outlay;
SV is the ending value of the assets and,
i is the discount rate (the internal rate of return).

Options which allow equity capital to be incorporated have been identified in the literature and can be classified under one of four headings. These headings are:

1. Partnerships,
2. Corporations,
3. Crop Share Agreements and,
4. Leasing Arrangements.

Each of these options is compared to the standard sole proprietorship financed using various combinations of debt capital and owner-operator equity.

Sole Proprietorship

The control against which all subsequent comparisons will be based is the sole proprietor farm. The owner of the farm starts the trial period with one of the following financial structures:

1. 100 percent equity,
2. 75 percent equity and 25 percent debt,
3. 50 percent equity and 50 percent debt,
4. 40 percent equity and 60 percent debt or,
5. 25 percent equity and 75 percent debt.

Debt is financed at historic rates of interest for both operating and term loans. In keeping with the credit policy specified in the model the farm is termed a failure if equity falls below 20 percent and if no further operating credit is available. The W_t term in Equation 3.1 is modified as shown in Equation 3.4:

Equation 3.4

$$W_t = W (P) (1-tx)$$

where: W_t is the annual cash flow to each investor;
W is the level of withdrawals allowed in each period;
P is the farmer's ownership share and,
(1-tx) is the farmer's personal tax rate.

In the sole proprietor cases the 'P' term is set equal to 1 so that Equation 3.4 reduces to $W_t = W (1-tx)$ which is the after-tax cashflow to the farmer.

General Partnership

The business is restructured as a partnership with the equity contributions of the farm partner the same as outlined in the sole

proprietor cases.[3] The portion of the required capital that was previously financed with debt is replaced with equity from a non-farming partner.

Under the partnership Equation 3.4 is modified as shown in Equations 3.5 and 3.6 for the farming partner and non-farming partner respectively. The farmers's ownership shareremains as 'P'. The non-farming partner's share is therefore (1-P).

Equation 3.5

$$W_t = W (P) (1-tx)$$

Equation 3.6

$$W_t = [W (1-P)] (1-tx)$$

A variation on the general partnership is the limited partnership. Other than restricting the total amount which a limited partner may invest, and the degree to which he can participate in day-to-day management of the firm, this alternative was judged to be not sufficiently different to warrant separate evaluation. There are however, legal implications to the limited partnership which may serve to make an investment in a farm business more attractive if made under the terms of a limited partnership agreement.[4]

Corporations

As with the partnership cases, debt capital used in the sole proprietorship is replaced with equity capital obtained through the sale of shares. Shares are assumed to be sold privately to maintain eligibility for the small business tax exemption.

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[3]The 100% equity case is excluded from each of the other cases except for the corporate farm where it serves as an indication of the impact of the taxation system on the income of the farmer.
[4]See Looney (1983) and Alberta Agriculture 'Farm Business Partnerships' for a more detailed discussion of limited partnerships.

The role of the managing shareholder under this form of incoporation is a dual one. He is both an owner of the business and by virtue of the salary he receives, an employee. Unlike the other business types the salary paid by the corporation to its employee is a deductible expense to the corporation and the corporation is liable for taxes as an entity. The tax rate (tx) on corporate income is the Alberta small business rate of 20%. Tax rates on dividends in the hands of the shareholders are their personal tax rates.

The 100% owner-operator controlled corporation offers considerable potential to shelter income by distributing profits earned as dividends rather than as a salary or as some combination of dividends and salary. Under current tax regulations approximately $40,000 of income can be withdrawn as dividends without triggering tax providing that there is no other source of income. This is due to the interaction of the dividend taxes paid by the corporation, the gross-up mechanism on dividends in the hands of the shareholder and the application of dividend tax credits prior to the calculation of the Basic Federal Tax.

One of the costs associated with acquiring equity capital from an outside investor is that some flexibility may be sacrificed. For example, in the multiple owner corporations profit is distributed using the dividend mechanism rather than as salaries paid to the owners. Considerable scope for minimization of taxes on income remains. Careful planning to distribute income in the form of salaries and dividends may reduce income tax liability below what the same level of income in a sole proprietorship or partnership would involve. Such strategies however are beyond the scope of this project.

In the corporate cases profits are distributed in the form of dividends. The mechanism for determining the allowable level of dividends is the same as was used in the other cases for withdrawals.

The exception to this rule is the CORP100 case. Under current taxation regulations a large portion of profit can be distributed as a dividend without attracting tax in the hands of the shareholder. In order to show the impact of the taxation system the model calculated the maximum allowable dividend which could be declared without attracting tax. The model then chose the lesser of the allowable dividend based on surplus cash (as in the other cases) or the dividend calculated to minimize tax. The distribution formula used in the CORP100 case is Equation 3.4. In each of the other corporate cases Equations 3.5 and 3.6 are used where (P) and (1-P) are the proportion of shares owned by the farm and non-farm shareholders respectively.

Crop Share Agreements

A traditional method of gaining control of assets without incurring the risks associated with ownership of assets which fluctuate in value is through crop share rental agreements. While rental and leasing agreements are not equity they do offer the potential for the farmer to gain control of productive assets at perhaps lower cost than by having to finance their acquisition using conventional means. Previous research by Bauer (1983) has indicated the nature of returns that have been realized by landlords. An evaluation of the impact of these rental agreements on the farm firm is part of this research.

The crop share agreement specified in the model is the commonly found one-third/two-thirds agreement. In addition, more and more landlords are assuming a larger share of production risk by agreeing to pay for part of the fertilizer and herbicide in the same proportion. The farmer is assumed to purchase 160 acres along with the buildings associated with the hog enterprise and the necessary equipment to farm 480 acres. Various combinations of debt and equity, as in previous

cases, are used to finance these assets. The remaining half-section is rented by the farmer under the terms of the agreement discussed above. Appropriate adjustments are made to the revenue and expense statement and to inventory levels. The distribution formula used for the farmers income is Equation 3.1 after deducting the landlord's share of income.

The landlord's income was estimated based on average yields and prices for the area. Net cash flows were calculated after the landlords's share of fertilizer, herbicides and property taxes were deducted. Prices and yields used are contained in the Appendix. To avoid problems with inventory and adjustments for quantities consumed in the hog enterprise the farmer was assumed to have purchased the landlords's share of grain at prevailing market prices. The landlord's net income was taxed at the 30% rate. The distribution formula used is shown as Equation 3.7:

Equation 3.7

$$CF_t=[(\ 320\ (P_b)(Y_b)/3) - Costs](1-tx)$$

where: CF_t is the annual cash flow to the landlord;
P_b is the average price of barley in each period;
Y_b is the average yield of barley in each period and,
Costs are the owner's share of fertilizer, spray and taxes.

Lease Arrangements

A second means of gaining control of assets without purchase is through leasing arrangements. In agriculture the most common form of leasing is the cash rent agreement. Lease rates are typically on a dollars per acre basis and are generally arrived at through a negotiation process considering such factors as the 'market' rate for similar leases, the crop to be grown, expected prices and yields,

summerfallow and other farming practices and the number of cultivated acres. Because these leases tend to be short-term (one to two year terms) and because the leases are frequently renegotiated to reflect changes in the basis of the lease, it is felt that this particular form of lease is not really different from a crop share lease.

A fixed rate lease as outlined in Ashmead's proposal is evaluated. The assets purchased by the farmer are the same as for the crop share case and the landlord contributes the same amount of land. Under the terms of the proposal the farmer pays 5% of the market value of the land at the time the lease is struck. The distribution formula used is Equation 3.4. The cashflow to the landlord is represented in Equation 3.8:

Equation 3.8

$$CF_t = .05(Land_{77})$$

where: CF_t is the annual cash flow to the landlord;
$Land_{77}$ is the market value of the leased land in 1977.

E. Method of Analysis

An investor attempting to evaluate alternative investments has a number of financial tools available. Some of these include payback period, return on investment, net present value (NPV) and the internal rate of return (IRR). Under most circumstances the NPV approach is the preferred method as the results are unambiguous. IRR will normally yield results which are consistent with NPV but with some non-conventional investments it is possible to obtain multiple rates of return.

Analysis of alternative investment opportunities using NPV normally occurs prior to making the investment. NPV requires the selection of a discount rate which in itself can be a difficult task.

Projected cash flows are then discounted at the selected discount rate. If an investor were contemplating an equity investment in the case farm in 1976 the recommended method of investment analysis would be NPV.

One of the advantages of IRR over NPV is that results are sometimes more easily understood. As Aplin, Casler and Francis (1977, p.35) point out "the notion of rate of return is a common one in the business world as compared to the notion of net present values." The results presented here are 'ex post' and may be more easily interpreted when presented in the form of yields calculated using the IRR method. For these reasons the IRR has been used as the method of analysis.

The results of the analysis are presented in the next chapter.

4. Results and Analysis

The first part of this chapter presents the results in a general way. A brief discussion of the results from the viewpoint of the farmer and the investor follows. Analysis of performance by business type divided according to those options using debt and those options using equity concludes the chapter.

Output from the model includes an income statement, a balance sheet and a series of financial ratios. Included in the ratio analysis are the current ratio, the debt/equity ratio (leverage ratio) and after tax internal ratio of return. The annual after tax returns to each investor are calculated using Equation 3.2. The basis for determining the annual cash flow is Equation 3.1 modified as required for each of the alternative business structures as shown in Equations 3.4 to 3.8. These rates measure the relative performance of each alternative on an annual basis. Equation 3.3 is used to calculate a second series of internal rates of return representing the return on investment for the entire period 1977 to 1985. Intermediate returns have been calculated to show the returns which would have been realized had the investment been liquidated earlier in the trial period (i.e., 1977 to 1978, 1977 to 1979, etc.).

A. Returns to the Farming Investor

The range in possible after-tax returns on investment, over the trial period, and over all of the possible business structures and equity levels, was from 9.79% to 11.25%. Both the high and low returns were obtained using 25% equity and were obtained using the corporate (CORP) structure and the crop share (CS) lease respectively.

As equity levels increased the spread between the returns for a given level of investment decreased. For example, at the 25% equity

level the range from low to high was about 1.5 percentage points as noted above. At the 100% equity level the spread between high and low was less than half a percentage point. For the 75%, 50% and 40% the range was slightly less than one percentage point. The high returns at those levels came from the sole proprietor (SP) option using debt capital. At the 100% equity level the CORP farm was the highest yielding option. In all cases the CS lease was the poorest performing alternative.

Table 4.1 contains the complete results for both the farming and non-farming investor by business structure and by equity levels for the entire period 1977 to 1985.

B. Returns to the Non-Farming Investor

Returns over the trial period were generally lower for the non-farm investor than for the active farming partner or shareholder. The corporate farm and both of the leasing options produced constant returns across investment levels. The highest return for the investor came from using a crop-share lease at 11.73% followed by the fixed rate (FR) lease at 10.76%. In both of the lease options the value of 'equity' contributed by the investor is the constant value of the leased land and so the return was expected to be constant. The corporate version of the farm also gave a constant return for the investor regardless of investment level. An investment in a corporate farm in 1977 would have produced a return, compounded to 1985, of 10.64%. Only the general partnership (GP) exhibited variability in returns across investment levels. The GP ranged from 10.39% at 25% equity (75% investor equity) to 10.53% at the 75% level.

The reduced range in investor returns from the lease options and from the corporate farm, in comparison to the farmer's returns is

Table 4.1 **After-tax IRR by Business Structure and Equity Level (1977-1985)**

A. Returns to Farmer

BUSINESS TYPE	EQUITY LEVEL OF FARMER				
	100%	75%	50%	40%	25%
SP	10.71%	10.95%	11.12%	11.14%	11.02%
CORP	11.15%	10.85%	11.05%	11.14%	11.25%
GP	N/A	10.69%	10.75%	10.78%	10.84%
FR	N/A	10.55%	10.67%	10.72%	10.58%
CS	N/A	10.11%	10.27%	10.22%	9.79%

B. Returns to Investor

BUSINESS TYPE	EQUITY LEVEL OF FARMER			
	75%	50%	40%	25%
CORP	10.64%	10.64%	10.64%	10.64%
GP	10.53%	10.43%	10.41%	10.39%
FR	10.76%	10.76%	10.76%	10.76%
CS	11.73%	11.73%	11.73%	11.73%

interpreted as arising in the constant marginal taxation rate applied to income generated. While taxes paid by the farmer are variable according to the level of income earned, the non-farm investor was assumed to be in a 30% marginal tax bracket due to income from other sources. Consequently a larger and constant proportion of income was diverted to paying taxes. In each of the cases with constant returns there was little pass through of tax benefits. Taxes were paid at the corporate level for the business and on dividends in the hands of the shareholder in the corporate farm model. In the lease options there was no depreciation allowance or investment tax credits to reduce personal taxes payable. In the partnership case taxation of income occured in the

hands of the partner. While the taxation rate for the non-farm partner was the same as in the other cases there appeared to be some pass through of taxation benefits from the business to the individual. This introduced a degree of variability to returns within the partnership which was not evident in the other options.

C. Returns by Business Type

The five possible business types displayed different characteristics in the financial outcomes of the simulation. The following section will discuss, in more detail, the returns for each type of farm structure. Those options which employed borrowed capital in addition to equity are discussed and summarized first and are followed by a discussion and summary of the pure equity options.

Options Using Debt and Equity Financing

1. Sole Proprietorships

The sole proprietorship (SP) farm is the base case against which the other cases and options may be compared. The results of the after-tax IRR analysis for the SP farms are summarized in Table 4.2. The SP100 had an after-tax return 10.71% over the trial period. Higher returns could have been realized in the short-run if the farm investment had been liquidated earlier in the trial period. For example, a return of 21.45% would have been earned if all assets had been sold at the end of 1978. Keeping the farm an additional year, to the end of 1979, resulted in a reduction in potential earnings to 18.08% compounded over the three year period. The rate of return on investment continued to decline for each additional year that ownership was maintained until the compounded return for the nine year trial period had declined to 10.71%.

Table 4.2 **Sole Proprietor - After-Tax IRR for Various Periods and Equity Levels (Assets Purchased Dec. 31, 1976)**

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
100%	16.13	21.45	18.08	17.79	17.33	16.18	13.54	11.57	10.71
75%	18.04	24.95	20.40	19.84	19.11	17.77	14.49	12.02	10.95
50%	21.85	31.66	24.85	23.79	22.47	20.45	16.00	12.62	11.12
40%	24.72	36.48	28.00	26.53	24.85	22.28	17.04	12.94	11.14
25%	33.66	50.03	36.58	33.87	31.16	27.17	19.90	13.87	11.02

Similar results were shown for the other SP cases in which debt capital was employed. The impact of leverage was dramatically evident in some of the returns early in the trial period. Financing the farm using 75% borrowed capital in 1977 would have resulted in a 50.03% return on investment for the period 1977 to 1978. Even if the farm had been retained until land values began to decline in 1981, the potential return was still 31.16%. However by retaining ownership until the end of the trial the overall rate was reduced to 11.02%. Use of debt at more 'moderate' levels tended to reduce the magnitude of the range in returns but at the same time provided better overall returns than the 100% equity financed farm. The highest return was obtained in the SP40 farm at 11.14% followed closely by the SP50 farm at 11.12%.

The total annual return (i.e. operating returns plus asset value changes) is shown in Table 4.3. With the exceptions of the SP100 and SP75 cases the annual return on investment was negative from 1983 onwards. In the SP100 and SP15 cases the return on investment was positive for 1985 and at the 50% level the return was essentially zero. This reflects the decline in land values and the impact of leverage.

Table 4.3 **Sole Proprietor - Annual Return on Equity Invested**

A. Annual Operating Return on Equity Invested

Equity Level	100%	75%	50%	40%	25%
Year					
1977	7.27%	6.23%	4.15%	2.58%	-2.11%
1978	11.48%	11.87%	12.62%	13.15%	14.58%
1979	8.91%	8.56%	7.90%	7.48%	6.41%
1980	10.31%	10.26%	10.03%	9.89%	9.43%
1981	1.43%	-0.18%	-3.23%	-5.52%	-10.93%
1982	1.21%	-0.21%	-2.72%	-4.94%	-9.76%
1983	2.66%	1.50%	-0.44%	-2.03%	-5.69%
1984	2.96%	1.98%	-0.08%	-2.23%	-7.46%
1985	2.17%	0.96%	-1.76%	-4.77%	-13.20%
Avg. Return	5.38%	4.55%	2.94%	1.51%	-6.02%
Std. Dev.	3.86%	4.46%	5.61%	6.66%	8.87%

B. Total Annual Return on Equity Invested

Equity Level	100%	75%	50%	40%	25%
Year					
1977	16.13%	18.04%	21.85%	24.72%	33.66%
1978	27.03%	32.27%	42.27%	49.38%	68.44%
1979	11.46%	11.78%	12.25%	12.54%	13.13%
1980	16.88%	18.16%	20.64%	22.20%	26.03%
1981	15.32%	16.12%	17.31%	18.37%	20.80%
1982	9.97%	10.87%	10.81%	10.16%	8.94%
1983	-2.45%	-4.30%	-7.50%	-10.10%	-15.92%
1984	-3.17%	-5.01%	-8.45%	-12.08%	-20.80%
1985	3.13%	2.07%	-0.27%	-2.32%	-9.50%
Avg. Return	10.48%	11.11%	12.10%	12.54%	13.86%
Std. Dev.	9.30%	11.30%	15.16%	18.19%	26.80%

The cash flow component of the annual return on equity is shown in the top panel of Table 4.3. While the highly levered farms began to show losses on farming operations (i.e. excluding changes in asset values) as early as 1981 the total return was not negative until 1983. For example,

high interest casts were largely responsible for a negative cash return, in 1981 at the 25% equity level. However, asset value changes were sufficiently great to offset this loss and produce an annual return of 20.80%. While the overall return is important, the cash flow component as shown in Table 4.3 is an indicator of financial stress. The SP25 case provides a good example. Considering only the cash income component of the total return, only three of the nine years showed positive cash flow. When asset value appreciation and depreciation was included however, the total annual return was negative in only three of the nine years. An investor, while concerned with the total return on his investment, must also be aware of difficulties arising in the cash earnings of the investment. To continue with the SP25 example, the investor could have received annual total returns of 33.66%, 68.44%, 13.13%, 26.03% and 20.80% for each of the years 1977 to 1981. If he had interpreted the loss on operations of 10.93% suffered in 1981 as a symptom of financial stress, and if he had sold at the end of 1981 his compound return would have been 31.16%. The low and negative returns obtained in 1982 through 1985 would have been avoided. By failing to recognize that the farm was in some degree of financial difficulty and by continuing to hold the investment on the basis of overall returns calculated using asset value changes the investor would not have become concerned until 1983. By that time his compound return would have been reduced to 19.9% and he would have suffered a loss on an annual basis of close to 16%. Subsequent losses on operations in 1984 and 1985, primarily due to high interest costs on an increasing operating loan balance, eventually reduce the compound return to 11.02% for the SP25 case.

Even though none of the trial farms failed, returns declined sharply for those farms with 50% or less equity in the later years of

the simulation. By the end of the trial period leverage ratios which had been indicating financial progress had begun to show deterioration. With the collapse of land prices in 1982, and a decline in net income at the same time, the impact of large debt loads was immediate and severe. Every case showed negative total returns for the years 1983 and 1984, and the low equity farms[5] also reported negative growth in 1985.

These results indicate the influence of leverage on the financial health of the business and on the well-being of the owners of the business. Moderate use of debt can have beneficial effects on the business. Unfortunately the working definition of what constitutes 'moderate' debt is constantly changing with interest rates, the return on assets and the value of assets used in production. The next section examines the impact of leasing land.

2. Crop Share Lease

The use of crop share leasing, while not equity financing, is a means of controlling assets without ownership and incurring large debt loads. In general the crop share lease eliminated much of the leverage effect that was evident in the returns from the SP case farms. Cash returns, while lower in some cases than the SP farms, were much less risky. At the 25% equity level for example, the SP25 case showed an average loss of -6.02% with standard deviation of 8.87%. The CS25 had a higher level of risk associated with the average return but the return was over 19 points higher. Tables 4.4 and 4.5 indicate the annual operating and total returns for the farmer and landlord.

Farms using the lease option suffered losses on operations in 1981 only. In comparison the SP75 suffered operating losses in both 1981 and 1982 and the lower equity SP cases suffered losses in each year from

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[5]Low equity is taken to be those farms with 50% or less equity.

Table 4.4 Crop Share Lease - Annual Return on Equity Invested - Farmer

A. Annual Operating Return on Equity Invested - Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	8.12%	12.18%	15.23%	24.36%
1978	14.02%	20.34%	24.96%	28.30%
1979	10.93%	14.63%	17.10%	23.39%
1980	12.03%	15.56%	17.84%	23.51%
1981	-0.22%	-0.46%	-1.07%	-3.51%
1982	0.81%	0.92%	0.64%	0.09%
1983	2.90%	3.37%	3.41%	3.42%
1984	3.72%	4.52%	4.64%	5.97%
1985	2.38%	2.64%	2.45%	3.71%
Avg. Return	6.08%	8.19%	9.47%	13.25%
Std. Dev.	4.98%	7.11%	8.82%	13.55%

B. Total Annual Return on Equity Invested - Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	13.57%	15.15%	16.13%	19.89%
1978	22.74%	28.77%	33.18%	45.90%
1979	13.47%	14.72%	15.16%	17.70%
1980	15.66%	17.50%	15.56%	21.92%
1981	6.70%	5.85%	18.74%	3.78%
1982	8.02%	7.97%	5.00%	3.89%
1983	2.59%	0.89%	-0.42%	-5.04%
1984	2.52%	0.84%	-0.22%	-6.13%
1985	3.50%	1.88%	0.49%	-4.37%
Avg. Return	9.86%	10.39%	10.69%	10.84%
Std. Dev.	6.56%	8.88%	10.62%	16.16%

1981 to 1985.

Total returns in the CS cases were lower than those from the SP cases but displayed less dispersion than the SP cases at comparable investment levels. While the mean total return was higher in the SP farms the lease appeared to lessen the impact of falling land values. For example in all of the SP farms the after-tax IRR was negative in 1983 and 1984. In the low equity cases the total return was negative in 1985 as well. The CS farms however did not produce negative total returns until equity was at 50% or less. In 1983 and 1984 losses in the CS50 trial were resticted to less than 0.5% of beginning equity. In the CS25 case the losses extended into 1985 but were smaller than the losses which occurred in the SP25 case.

From the landlord's perspective the CS lease offered an operating return of 3.27% with standard deviation of 1.71%. A downward trend in operating returns was evident. While the farmer's operating returns were negative in 1981 the landlord's returns were positive in all cases in every year. The CS lease has reduced the financial risk exposure for the farmer and has reallocated some of the production risk to the landlord. The absence of negative returns for the landlord would suggest that the allocation of risk is not equitable. On the other hand the difference in the returns between the farmer and the landlord may be related to risk associated with the farmer's hog enterprise rather than due to risk associated with grain production on rented land.

The landlord benefited the most from the changes in asset values which occurred over the trial period. The mean annual total return over the trial period was 12.48% with standard deviation of 19.41%. On a compounded basis the after-tax IRR for the landlord was 11.73%. A shorter investment period would have seen higher returns realized. The maximum potential return available was 32.19% and would have required

Table 4.5 Crop Share Lease - Annual Return on Equity Invested - Landlord

A. Annual Operating Return on Equity Invested - Landlord

Equity Level	75%	50%	40%	25%
Year				
1977	5.19%	5.19%	5.19%	5.19%
1978	4.62%	4.62%	4.62%	4.62%
1979	3.88%	3.88%	3.88%	3.88%
1980	5.72%	5.72%	5.72%	5.72%
1981	4.20%	4.20%	4.20%	4.20%
1982	1.73%	1.73%	1.73%	1.73%
1983	1.88%	1.88%	1.88%	1.88%
1984	1.33%	1.33%	1.33%	1.33%
1985	0.90%	0.90%	0.90%	0.90%
Avg. Return	3.27%	3.27%	3.27%	3.27%
Std. Dev.	1.71%	1.71%	1.71%	1.71%

B. Total Annual Return on Equity Invested - Landlord

Equity Level	75%	50%	40%	25%
Year				
1977	24.47%	24.47%	24.47%	24.47%
1978	40.65%	40.65%	40.65%	40.65%
1979	5.22%	5.22%	5.22%	5.22%
1980	19.06%	19.06%	19.06%	19.06%
1981	37.56%	37.56%	37.56%	37.56%
1982	15.77%	15.77%	15.77%	15.77%
1983	-13.27%	-13.27%	-13.27%	-13.27%
1984	-17.77%	-17.77%	-17.77%	-17.77%
1985	0.63%	0.63%	0.63%	0.63%
Avg. Return	12.48%	12.48%	12.48%	12.48%
Std. Dev.	19.41%	19.41%	19.41%	19.41%

Table 4.6 Crop Share Lease - After-tax IRR for Various Periods and Equity Levels (Assets Purchased Dec. 31, 1976)

A. After-Tax IRR to Farmer - Various Periods and Equity Levels

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
75%	13.57	18.06	16.53	16.31	14.46	13.45	11.46	10.86	10.11
50%	15.15	21.76	19.37	18.90	16.23	14.86	12.82	11.32	10.27
40%	16.33	24.47	21.43	20.75	17.43	15.73	13.28	11.50	10.22
25%	19.89	32.24	27.22	25.88	21.13	18.08	14.18	11.69	9.79

B. After-Tax IRR to Landlord - Various Periods and All Equity Levels

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
All	24.47	32.19	22.76	21.86	24.67	23.25	17.68	13.06	11.73

the land to have been sold at the end of 1978.

A similar pattern was evident in the after-tax IRR to the farmer. The compound return over the trial period was highest in the CS50 case at 10.27%. As equity decreased the return decreased to 10.22% in the CS40 case and also decreased as equity increased. The lowest return of all of the cases was 9.79% and was obtained using the CS25 lease. Table 4.6 contains the after-tax internal rates of returns for both the farmer and landlord for the trial period. As with the other structures returns over a shorter investment period would have been higher.

Table 4.7 Fixed Rate Lease - After-Tax IRR for Various Periods and Equity Levels (Asset Purchased Dec. 31, 1976)

A. After-Tax IRR to Farmer

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
75%	13.77%	18.30%	16.83%	16.82%	15.13%	14.00%	12.50%	11.35%	10.55%
50%	15.46%	22.10%	19.78%	19.54%	17.03%	15.49%	13.40%	11.80%	10.67%
40%	16.72%	24.88%	21.92%	21.51%	18.38%	16.47%	13.96%	12.07%	10.72%
25%	20.51%	32.87%	27.93%	26.92%	22.27%	19.15%	15.50%	12.58%	10.58%

B. After-Tax IRR to Landlord

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
All	22.01%	31.66%	22.06%	20.77%	23.43%	22.15%	16.52%	11.89	10.77%

3. Fixed Rate Lease

The fixed rate lease provided higher operating returns to the farmer than either the SP or the CS options. Average total returns were also higher than under these other structures. Riskiness, as measured by the standard deviation, was slightly higher than that associated with the CS or SP cases. The landlord was worse off under the FR lease than he would have been had he opted for a conventional crop share lease. Because the annual lease payment was fixed for the entire lease period (trial period) and because the payment was based on the market value of the leased land at the outset of the trial period, the return to equity deteriorated over time as asset values rose. The FR lease, as specified, lacks a mechanism to translate gains in value of the leased asset into increased cash flow to the owner. The income foregone is not deferred

into capital gain to be captured later and consequently, the return on investment under the FR lease is lower than for the CS option. Table 4.7 indicates the return on investment for the trial period. As with the SP and CS cases the FR lease would have produced higher returns if the investment had been terminated earlier.

Annual returns to equity are shown in Tables 4.8 and 4.9. Average returns for the farmer were greater under this lease than under either the CS lease or the SP cases. Variation in the total return is slightly higher for the FR leascompared to the CS lease at comparable equity levels. The landlord is worse off in terms of total returns as the mean return is 11.82% compared to 12.48% in the CS case. The FR option is less risky however, with a standard deviation of 18.86% compared to 19.41% for the CS lease.

In a fashion similar to the CS lease the FR lease is apparently able to temper the impact of falling land values by eliminating much of the impact of leverage. At equity of 50% or better both the operating flows and the total return were positive in every year. At the 40% level operating returns were still positive in every year but small losses on a total basis occurred in 1983 and 1984. When the farmer's equity was reduced to 25% an operating loss occurred in 1981. Total annual returns however were negative from 1983 through to the end of the trial. Losses suffered in those years however, were lower than in the CS lease and much lower than the losses suffered as a sole proprietor.

The after-tax IRR for the farmer ranged from a low of 10.55% the to a high of 10.72%. The maximum intermediate return would have been 32.87% in the FR25 obtained by winding-up operations at the end of 1978. Unlike the CS cases however, the highest return came at the 40% level instead of the 50% level and the lowest return came from the FR75 case. This would suggest that the low 5% lease rate allows more debt to be

Table 4.8 **Fixed Rate Lease - Annual Return on Equity Invested - Farmer**

A. Annual Operating Return on Equity Invested - Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	8.33%	12.49%	15.61%	24.98%
1978	14.31%	20.74%	25.44%	38.96%
1979	11.38%	15.16%	17.72%	24.22%
1980	13.14%	16.90%	19.40%	25.57%
1981	1.12%	1.07%	0.70%	-1.05%
1982	1.00%	0.99%	0.74%	0.25%
1983	3.22%	3.56%	3.64%	3.73%
1984	3.58%	4.19%	4.26%	5.34%
1985	2.23%	2.39%	2.18%	3.20%
Avg. Return	6.48%	8.61%	9.96%	19.10%
Std. Dev.	5.04%	7.24%	8.97%	13.72%

B. Total Annual Return on Equity Invested - Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	13.77%	15.46%	16.72%	20.51%
1978	23.02%	29.14%	33.63%	46.53%
1979	13.91%	15.25%	16.19%	18.58%
1980	16.76%	18.81%	20.28%	23.90%
1981	7.98%	7.24%	6.61%	5.24%
1982	7.84%	7.80%	7.37%	4.68%
1983	2.92%	1.17%	-0.05%	-4.28%
1984	2.37%	0.68%	-0.39%	-6.03%
1985	3.42%	1.70%	0.43%	-4.23%
Avg. Return	10.22%	10.81%	11.20%	11.66%
Std. Dev.	6.71%	9.08%	10.82%	16.33%

profitably employed before returns begin to suffer due to debt servicing requirements. The after-tax return for the landlord for the trial period was 10.77%. Again a higher return of 31.66% would have occurred if the land were to have been sold at the end of 1978.

Summary of Debt/Equity Options

Each of the business alternatives has strengths and weaknesses. The SP farms gave the best return on investment over the trial period but were least able to absorb the shock of falling land prices. The FR lease gave the highest return to the farmer but did so apparently at the expense of the landlord. An adjustment procedure to allow the dollar amount of the lease to vary with the market value would probably have produced more equitable results. Both the CS and FR leases had less variable returns to equity than the SP farms. The returns to equity under the FR lease were slightly higher than under the CS lease but the FR lease was slightly more risky.

From the farmer's perspective the highest after-tax returns on investment were offered by the sole proprietorship using moderate levels of debt. Under different economic circumstances than those modelled here, the definition of moderate debt and the financial outcomes as a consequence of using that debt may be quite different. Of the two lease alternatives the FR lease seemed to be preferable from the farmer's viewpoint. The landlord, on the other hand, is likely to view the CS lease more favourably as it appears to be more flexible in its ability to maintain cash flows over time. For the farmer both leasing alternatives seem to temper the impact of falling land values on his equity growth by reducing the proportion of his total investment in land. The CS lease also offers the opportunity to allocate some production risk to the landlord.

Table 4.9 **Fixed Rate Lease - Annual Return on Equity Invested - Landlord**

A. Annual Operating Return on Equity Invested - Landlord

Equity Level	75%	50%	40%	25%
Year				
1977	3.54%	3.54%	3.54%	3.54%
1978	2.93%	2.93%	2.93%	2.93%
1979	2.12%	2.12%	2.12%	2.12%
1980	2.07%	2.07%	2.07%	2.07%
1981	1.81%	1.81%	1.81%	1.81%
1982	1.35%	1.35%	1.35%	1.35%
1983	1.18%	1.18%	1.18%	1.18%
1984	1.38%	1.38%	1.38%	1.38%
1985	1.70%	1.70%	1.70%	1.70%
Avg. Return	2.00%	2.00%	2.00%	2.00%
Std. Dev.	0.74%	0.74%	0.74%	0.74%

B. Total Annual Return on Equity Invested - Landlord

Equity Level	75%	50%	40%	25%
Year				
1977	24.01%	24.01%	24.01%	24.01%
1978	40.01%	40.01%	40.01%	40.01%
1979	4.38%	4.38%	4.38%	4.38%
1980	16.80%	16.80%	16.80%	16.80%
1981	35.23%	35.23%	35.23%	35.23%
1982	15.64%	15.64%	15.64%	15.64%
1983	-13.62%	-13.62%	-13.62%	-13.62%
1984	-17.55%	-17.55%	-17.55%	-17.55%
1985	1.52%	1.52%	1.52%	1.52%
Avg. Return	11.82%	11.82%	11.82%	11.82%
Std. Dev.	18.86%	18.86%	18.86%	18.86%

While none of the farms actually are classified as failures in the context of failure used in the model, some of the low equity farms do not appear to have very good prospects for the long-run. Negative operating returns in the majority of years, consecutive losses over five or more years combined with declining asset values and income levels produced deterioration in the debt to equity ratios. The addition of equity in the form of leased land, while able to slow the rate of deterioration, did not produce a reversal. In fact the farm with the highest leverage ratio at the end of 1985, and therefore the farm at most risk, was the CS25 farm. The low equity FR farms were only marginally better.[4]

At the 25% level of equity, and beginning in about 1981, all of the farms began to show symptoms of a lack of liquidity. By 1985 the SP25 case had a current ratio of 0.58:1. The CS25 and FR25 farms were slightly better with a current ratio of 1.08:1 in each case. Above 40% equity liquidity was not a problem in any of the trials. The farms controlling leased assets were more liquid at the 40% and 50% levels than the SP40 or SP50. At the 75% level the sole proprietor was more liquid.

The next sections will examine the results from those farms which used equity only.

Options Using Equity Financing

The three business structures which used only equity capital are the wholly owned sole proprietorship, the corporate farm and the general

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[4]The inclusion of the value of the leased asset on both the asset and liability sides of the balance sheet make the leverage ratios in the lease cases difficult to interpret. With no change in the level of borrowed capital the ratio still fluctuates because of changes introduced through asset value variability. Some caution is therefore required.

partnership. In each case the value of the assets purchased is the same as in the SP, CS and FR case farms. That portion of the capital requirement, which under the previously discussed arrangememts had been supplied from debt sources, is replaced by an equity investment by a partner or shareholder.

1. Corporate Farm

The 100% equity corporate farm (CORP100) is directly comparable in Table 4.10 to the SP100 farm and serves to identify the impact of different income tax regulations in the corporate case. The CORP100 returned 11.15% on an after-tax basis which was almost half a point higher than the return from the SP100. Mean annual total returns were very similar with the corporate farm averaging 10.76% and the SP returning an average of 10.48%. The cases had identical levels of risk as indicated by the standard deviation of 9.3%. As was the case with the other farm structures tested, the after-tax IRR would have been higher than 11.15% if the shares in the farm had been sold earlier. However, unlike the other cases, the differences in the potential gains between the CORP100 farm and the SP100 farm are not as large. There appears to be some advantage to be gained from restructuring the farm as a corporation simply in terms of potential tax benefits. Consideration of the costs associated with incorporation may outweigh that advantage.

In the other corporate cases the after-tax IRR for the farm shareholder ranged from 10.85% in the CORP75 case to 11.25% at the 25% equity level (Table 4.11). Higher returns were obtained from the SP farms at both the 75% and 50% equity levels than from the corporate farms. At the 40% and 25% investment levels however, the after-tax returns to the farmer were better than any other alternative. Table 4.11 shows the various returns which would have been realized for shorter

Table 4.10 **Comparison of the IRR for the Sole Proprietor vs. Corporation for Various Investment Periods (Assets Purchased Dec. 31, 1976)**

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
SP100	16.13	21.45	18.08	17.79	17.33	16.18	13.54	11.57	10.71
CORP100	16.24	21.42	17.97	17.99	17.67	16.54	13.97	12.02	11.15

investment periods. The most striking difference in comparing the kinds of returns shown in Table 4.11 with the returns from the options using debt is that the magnitude and range of returns is considerably lower due to the absence of any leverage effect. While the high returns, in years in which high net income combined with rapid asset appreciation, are not as high as those found in some of the debt options, neither are the losses in the later years when low income and plummeting asset values were having a large effect on debt-financed farms. For example, under the corporate structure the maximum possible return would have come from the CORP25 farm at 21.55% while the lowest return was 10.86% in the CORP75 case. In comparison, the SP75 case offered a return of 50.03% if the farm had been sold in 1978. While the highest potential return came at the 25% equity level so also did the lowest return of 9.79% under a crop share lease. The use of debt has obviously increased the degree of risk and uncertainty in these cases in comparison to the 100% equity financing in the corporate and SP100 cases.

The use of equity financing, while generally involving a cost in terms of slightly reduced returns, offers an increased degree of financial flexibility. As previously discussed, the SP, CS and FR farms

Table 4.11 Corporation - Annual Return on Equity Invested

A. Annual Operating Return on Equity Invested

Equity Level	100%	75%	50%	40%	25%
Year					
1977	9.03%	7.20%	7.20%	7.20%	7.20%
1978	12.94%	11.35%	11.35%	11.35%	11.35%
1979	10.26%	8.86%	8.86%	8.86%	8.86%
1980	11.64%	10.29%	10.29%	10.29%	10.29%
1981	3.64%	1.96%	1.96%	1.96%	1.96%
1982	3.06%	1.19%	1.19%	1.19%	1.19%
1983	4.00%	2.12%	2.12%	2.12%	2.12%
1984	4.63%	2.74%	2.74%	2.74%	2.74%
1985	3.64%	1.86%	1.86%	1.86%	1.86%
Avg. Return	6.96%	5.29%	5.29%	5.29%	5.29%
Std. Dev.	3.73%	3.86%	3.86%	3.86%	3.86%

B. Total Annual Return on Equity Invested - Farmer

Equity Level	100%	75%	50%	40%	25%
Year					
1977	16.24%	16.13%	16.12%	16.11%	16.08%
1978	26.74%	27.05%	27.11%	27.15%	27.27%
1979	11.23%	11.41%	11.69%	11.74%	11.82%
1980	18.03%	17.04%	17.57%	17.86%	18.31%
1981	16.29%	15.55%	16.06%	16.29%	16.55%
1982	10.42%	11.09%	11.08%	11.07%	11.05%
1983	-2.25%	-3.32%	-3.33%	-3.33%	-3.36%
1984	-2.29%	-3.49%	-3.50%	-3.51%	-3.53%
1985	2.90%	2.92%	2.92%	2.92%	2.92%
Avg. Return	10.76%	10.49%	10.64%	10.70%	10.79%
Std. Dev.	9.34%	9.54%	9.63%	9.68%	9.76%

...continued

Table 4.11 Continued

C. Total Annual Return on Equity Invested - Non-Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	16.15%	16.15%	16.15%	16.15%
1978	26.57%	26.57%	26.57%	26.57%
1979	10.88%	10.88%	10.88%	10.88%
1980	16.83%	16.83%	16.83%	16.83%
1981	15.23%	15.23%	15.23%	15.23%
1982	11.11%	11.11%	11.11%	11.11%
1983	-3.29%	-3.29%	-3.29%	-3.29%
1984	-3.46%	-3.46%	-3.46%	-3.46%
1985	2.92%	2.92%	2.92%	2.92%
Avg. Return	10.33%	10.33%	10.33%	10.33%
Std. Dev.	9.40%	9.40%	9.40%	9.40%

Table 4.12 Corporation - After-Tax IRR for Various Periods and Equity Levels (Assets Purchased Dec. 31, 1976)

A. After-Tax IRR to Farmer

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
75%	16.13	21.47	18.07	17.82	17.41	16.47	13.79	11.75	10.86
50%	16.12	21.49	18.18	18.04	17.68	16.71	14.01	11.96	11.06
40%	16.11	21.50	18.21	18.13	17.79	16.81	14.11	12.05	11.14
25%	16.08	21.55	18.27	18.28	17.97	16.96	14.25	12.18	11.27

B. After-Tax IRR to Investor

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
All	16.09	21.25	17.74	17.52	17.10	16.20	13.35	11.53	10.64

developed liquidity problems at equity levels of 50% or less. None of the equity financed farms showed any problems in this area due to the ability of the equity financed farms to regulate dividends and to 'self-finance' from conservation of cash surpluses and retained earnings.

The level of annual returns in the debt financed SP farms was higher than in the CORP farms. The risk exposure was very much higher. For example a return of 13.86% was schieved in the SP25 case. At the comparable level of investment in the equity financed corporate farm the return was about three points lower but the risk level was three times lower. Similar, but less extreme, results were obtained in the other cases.

2. General Partnerships

After-tax returns at all equity levels for both the active farming partner and the non-farming investor were lower in the GP farms than in either the SP farms or the CORP farms. The GP offered higher returns for the farmer than those received under the leasing arrangements. The investor's returns however, were lower than from the leases.

The after-tax IRR for each of the partners, as in the other cases, could have been higher if the length of the investment period had been shortened. The levels of returns which could have been achieved were comparable to the SP100 farm. Returns for the investor were slightly lower than the SP100 levels with the difference attributable to taxes. The complete set of results for both partners is shown in Table 4.13. A comparison of the returns in Table 4.13 with Tables 4.2 and 4.11 indicates the similarities in the streams of income especially as they accrue to the farming partner.

Table 4.13 General Partnership - After-Tax IRR for Various Periods and Equity Levels (Assets Purchased Dec. 31, 1976)

A. After-Tax IRR to Farm Partner

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
75%	16.11	21.40	18.05	17.81	17.36	16.23	13.52	11.56	10.69
50%	16.16	21.45	18.09	17.81	17.36	16.23	13.57	11.61	10.75
40%	16.18	21.47	18.12	17.84	17.40	16.26	13.61	11.65	10.78
25%	16.15	21.48	18.14	17.87	17.44	16.32	13.67	11.71	10.84

After-Tax IRR to Non - Farm Partner

	YEAR SOLD								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
EQUITY LEVEL									
75%	15.76	21.23	17.96	17.64	17.15	15.99	13.35	11.40	10.53
50%	15.76	21.17	17.88	17.55	17.06	15.89	13.26	11.30	10.43
40%	15.76	21.16	17.86	17.53	17.04	15.87	13.24	11.28	10.41
25%	15.75	21.14	17.84	17.51	17.02	15.85	13.22	11.26	10.39

The average operating return to equity on the GP farms was 5.38% with a standard deviation of 3.85% (Table 4.13). This was very similar to the 5.29% average return and standard deviation of 3.86% which was returned by the corporate farms.

The mean total return to the farmer in the GP75 and the CORP75 were identical at 10.49% but the corporation was more risky. At the other levels of investment the GP did not perform as well as the corporation. The non-farming partner, on the other hand, had a slightly lower return in the CORP75 in comparison to the GP75 but higher returns in the other CORP cases compared to the other GP cases. In all cases the CORP farms were the riskier investment.

Summary of Equity Options

In general equity financing offers the advantages of reduced risk at a cost of lower returns overall. Annual operating returns were higher in the CORP100 than in the SP100 control case. This was attributed to the effect of different taxation regulations governing corporate income. Returns in the other CORP cases were slightly lower. The SP100 and the GP cases had the same operating returns. The distribution of income between partners, and the tax treatment of income in the hands of the partners, produced slight differences in the after-tax IRR to each partner. The riskiness associated with variations in operating returns was identical in all of the 100% equity cases.

Total average returns to the farmer were higher in the corporate farms compared to the SP100 but the CORP farms were slightly more risky.

The GP farms were less risky than either the SP or the CORP businesses and offered slightly higher returns at the 40% and 25% equity levels. At the higher equity levels the GP cases were less risky than the CORP farms but offered correspondingly lower returns as well.

The returns in the SP farms at equity levels other than 100% indicate the nature of the trade-off in total returns that is involved in equity financing. All of the SP farms performed better in terms of total returns than the pure equity financed farms.

D. Performance Analysis by Investment Level

The question of acceptable levels of risk is one which each investor must answer individually. There are however some options at each level of investment which can be ruled out as being irrational. The selection of an investment alternative offering a lower return with more risk is an example of such irrational behaviour.

Table 4.14 General Partnership - Annual Operating Return on Equity Invested

A. Annual Operating Return on Equity Invested

Equity Level	75%	50%	40%	25%
Year				
1977	7.27%	7.27%	7.27%	7.27%
1978	11.46%	11.46%	11.46%	11.46%
1979	8.91%	8.91%	8.91%	8.91%
1980	10.30%	10.30%	10.30%	10.30%
1981	1.44%	1.44%	1.44%	1.44%
1982	1.23%	1.23%	1.23%	1.23%
1983	2.68%	2.68%	2.68%	2.68%
1984	3.04%	3.04%	3.04%	3.04%
1985	2.07%	2.07%	2.07%	2.07%
Avg. Return	5.38%	5.38%	5.38%	5.38%
Std. Dev.	3.85%	3.85%	3.85%	3.85%

B. Total Annual Return on Equity Invested - Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	16.11%	16.16%	16.18%	16.15%
1978	26.94%	26.97%	27.01%	27.05%
1979	11.48%	11.51%	11.53%	11.59%
1980	16.83%	16.93%	16.96%	17.04%
1981	15.35%	15.40%	15.49%	15.58%
1982	10.06%	10.13%	10.16%	10.24%
1983	-2.39%	-2.37%	-2.36%	-2.32%
1984	-3.03%	-3.00%	-2.98%	-2.94%
1985	3.04%	3.05%	3.04%	3.03%
Avg. Return	10.49%	10.53%	10.56%	10.60%
Std. Dev.	9.26%	9.27%	9.28%	9.29%

...continued

Table 4.14 Continued

C. Total Annual Return on Equity Invested - Non-Farmer

Equity Level	75%	50%	40%	25%
Year				
1977	15.76%	15.76%	15.76%	15.75%
1978	26.93%	26.93%	26.81%	26.75%
1979	11.57%	11.44%	11.41%	11.39%
1980	16.63%	16.54%	16.52%	16.50%
1981	15.05%	14.93%	14.91%	14.89%
1982	9.75%	9.64%	9.62%	9.61%
1983	-2.35%	-2.39%	-2.40%	-2.42%
1984	-3.05%	-3.14%	-3.14%	-3.16%
1985	2.88%	2.78%	2.77%	2.75%
Avg. Return	10.35%	10.26%	10.25%	10.23%
Std. Dev.	9.21%	9.20%	9.20%	9.20%

Five equity levels were specified in the model corresponding to 100%, 75%, 50% 40% and 25% equity. Investors are assumed to have sufficient capital to allow investment at only one level. The investor would therefore be interested in the maximum possible return for the least amount of risk at any given investment level.[7]

Using the principles of first order stochastic dominance the various investment alternatives were stratified by the level of investment required and then ranked to determine which were admissible options. Table 4.15 summarizes the findings.

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[7]The intent of this restriction is to avoid problems arising from attempting to ration capital. If $311456 is available the investor will invest at the 75% level and will choose the highest return available at that level. The option of combining an alternative offering a higher return at the 50% level with an investment at the 25% level is not permitted.

Table 4.15 Non-dominated Alternatives by Investment Level

Equity Level		SP	CORP			
100%	Return	10.48%	10.76%			
	Std. Dev.	9.30%	9.36%			
Equity Level - Farmer		CS	FR	GP	SP	
75%	Return	9.86%	10.22%	10.49%	11.11%	
	Std. Dev.	6.56%	6.71%	9.26%	11.30%	
Equity Level - Investor		GP	FR	CS		
75%	Return	10.35%	11.82%	12.48%		
	Std. Dev.	9.21%	18.86%	19.41%		
Equity Level - Farmer		CS	FR	SP		
50%	Return	10.39%	10.81%	12.10%		
	Std. Dev.	8.88%	9.08%	15.16%		
Equity Level - Investor		GP	CORP	FR	CS	
50%	Return	10.26%	10.33%	11.82%	12.48%	
	Std. Dev.	9.21%	9.40%	18.86%	19.41%	
Equity Level - Farmer		GP	CORP	FR	SP	
40%	Return	10.56%	10.70%	11.20%	12.54%	
	Std. Dev.	9.28%	9.68%	10.82%	18.19%	
Equity Level - Investor		GP	CORP	FR	CS	
40%	Return	10.25%	10.33%	11.82%	12.48%	
	Std. Dev.	9.20%	9.40%	18.86%	19.41%	
Equity Level - Farmer		GP	CORP	CS	FR	SP
25%	Return	10.60%	10.79%	10.84%	11.16%	13.86%
	Std. Dev.	8.88%	9.76%	16.16%	16.33%	26.30%
Equity Level - Investor		GP	CORP	FR	CS	
25%	Return	10.23%	10.33%	11.82%	12.48%	
	Std. Dev.	9.20%	9.40%	18.86%	19.41%	

At the 100% level only two options exist; the wholly owned corporate farm and the sole proprietorship with no debt. On the basis of the returns and the standard deviation it is not possible determine which of the two alternatives would be the preferred choice without knowing something about the risk preferences of the investor.

The farmer's rational choices at the 75% level are restricted to the CS lease, the FR lease, the general partnership and the sole proprietorship. The investor would also accept those structures as being rational choices although not necessarily in the same order of preference as the farmer. Both investors would choose not to participate in a corporate farm. For the farmer the identical return is offered with less risk in a partnership. The partnership offers the investor a higher return and lower risk than the corporate farm.

At 50% equity the equity financing options (GP and CORP) are dominated. The admissible options are the CS, FR and SP business arrangements. The investor has no dominated alternatives but the absence of a farmer willing to take on a partner or shareholder effectively eliminates those choices.

The crop share lease at the 40% investment level would be an unacceptable choice for the farmer. Again the investors options remain open as none of the possibilities dominates the others. The lack of a tenant in the CS lease would eliminate that possibility. At the 25% level neither the farmer nor the investor have dominated alternatives.

E. Performance Relative to Alternative Investments

A test of the performance of the various farm business investment structures is to compare their performance against alternative investments which could have been made at the time. These include, among others, investment in government bonds and investment in stocks on the

Toronto Stock Exchange.

The average yield for ten year Government of Canada Bonds issued in 1976 was 9.23%. The bonds are considered riskless as they are guaranteed by the government. Continuing the assumption that the non-farm investor is in a 30% marginal tax bracket, an investment in government bonds in 1976 would have yielded about 6.5% on an after-tax basis.

Over the period 1977 to 1985 the average return on a stock portfolio consisting of the TSE 300 stocks was 12.18%. This return is calculated by adding the annual dividend yield to the annual change in price represented by the TSE 300 Index. The Index value in 1977 was used as the basis. Investment in the stock market was relatively risky. The portfolio had a standard deviation of 14.37%.

The same investor, if he had chosen to place his money into the corporate case farm in Central Alberta, would have received an average return of 10.33%. While the return is 1.85 percentage points lower than the return obtained in the stock market the farm was considerably less risky. Standard deviation in the farming return was almost 5 percentage points lower at 9.4% than the standard deviation in the stock market return.

Based on the limited data available from the case farm the relationship between the returns from the farm and returns from the stock market was estimated. A correlation coefficient of -.12 was obtained which was not significantly different from zero. An investor choosing to combine the stock of the case farm into his investment portfolio would therefore view the farm as adding no additional risk to the portfolio. The expected return of the farm securities would therefore be the same as the risk-free rate.

Summary

Equity investment in agriculture, while not particularily attractive in its own right, may offer an opportunity to the investor to diversify his portfolio. Because there appears to be no correlation between the returns from the stock market and the returns from the farm, the investor can increase his return without increasing portfolio risk by combining the farm security with his stock market portfolio. Research by Barry (1980) indicated similar results. Barry found that investment in farm real estate added little systematic risk to a well diversified portfolio. Barry also concluded that "investments in farm real estate by well-diversified investors appeared to outperform the market and most individual assets too." The author cautions however that there are concerns with aggregation bias, data quality and unpaid resources in agriculture which would alter the results of the capital asset pricing model used in the research.

5. Institutional and Policy Considerations

Implementation of equity financing on any commercial scale within agriculture will require that policies and structures be developed or adapted to facilitate the transactions involved. This Chapter will examine existing structures and programs and discuss some of the proposals that have been suggested and changes in policy which may be required.

A. The Concept of the 'Family Farm'

Agriculture in North America has evolved relatively recently in comparison to Europe. Differences in land tenure systems, among other differences, have resulted in the 'family farm' being the predominant form of operating philosophy in North America. The term 'family farm' however, is ambiguous and value loaded, and the concept is constantly being revised in keeping with the dynamic nature of farm businesses. Today the definition of a 'family farm' is much different than one hundred or even twenty years ago.

A brief review of the policy literature will yield numerous definitions of what constitutes a 'family farm'. Despite the number and variety of definitions common elements are found. These include an expectation of economic viability; the proportion of labor contributed by the operator-owner and his family; and the freedom of the operator to manage the farm independently. While the first condition establishes a minimum size, the second effectively sets an upper limit to size. Unfortunately, virtually every farm in Alberta would probably satisfy these criteria and be classified as a 'family farm'.

The third criterion calls for freedom on the part of the farmer to manage the farm to his benefit. Various business structures such as the general or limited partnership, the corporation or even tenancy

arrangements could conceivably satisfy this condition and, not incidentally, the others as well. Earlier definitions of the 'family farm' placed considerable emphasis on ownership, as well as control, of the resources used in production. Current definitions of the 'family farm' tend to place more importance on the control of productive resources rather than ownership. Perhaps this is recognition of the fact that with the high levels of debt on many farms ownership is a euphemism rather than a fact. In any case the distinction between ownership and control is an important one. By relaxing that condition almost any farm business structure controlled by the farmer and his family can be classified as a family farm if the farm is economically viable and if the farmer and his family contribute most of the labor.

An examination of trends in farm size and sales indicates that fewer, larger farms account for the majority of farm production. The trend to large scale commercial agriculture has increased the minimum capital requirement for an economically viable farm unit. Traditional farm finance, in which the owner supplies the majority of the neccessary capital and the bank supplies the remainder, often at subsidized interest rates, has produced a situation where ownership is required for control. Increasingly, as intergenerational transfers of farm assets occur resulting in equity levels of 60% or less, the concept of ownership is less meaningful. The 1984 Farm Credit Corporation Survey showed that while the average level of equity in Alberta was 85%, 33.1% of Alberta farms account for 77.8% of the total liabilities in Alberta. The average equity on these farms is 62.2%. These levered farms tend to be the higher producers and account for 39.8% of all sales in Alberta. The average level of experience on these farms is seven years less than on the higher equity farms (FCC, 1985).

The traditional definitions of 'family farm', or more correctly, the policies based upon those definitions are seen to be the major obstacle to equity financing in agriculture. However, if the distinction between ownership and control is eliminated, it is possible to have a corporate farm owned in part by non-farm investors but under the control and management of a farm family.

Other policies related to the family farm concept include legislation restricting foreign ownership of land, regulations and laws related to soil conservation and other environmental concerns. A whole variety of issues involving land tenure and protection of tenants' rights, legal considerations of the banking system and the taking of land as security for loans, as well as rural social concerns such as education, health services and the quality of rural community life, are rooted in the 'family farm' concept. Consequently proposals involving even small changes may be met with resistance.

B. Financial Intermediaries

Assuming that the problems involved in dealing with traditional beliefs about the 'family farm' can be dealt with satisfactorily, other difficulties arise. The farmer in need of additional equity capital to finance his farm business has no ready means of communicating with the people that have the money he needs. He has no experience in the preparation of a prospectus nor does he have the time and experience to contact potential investors and sell a prospectus to them. Conversely the investor wishing to invest in agriculture may have no experience at all in the industry and may not be able to recognize that a Hereford and a heifer may be found in the same animal. Even if he is experienced in the practical aspects of agriculture the ability or expertise to analyse financial statements from a range of possible investment options may be

inadequate. An intermediary may be needed to bring the two parties together and effect a mutually satisfactory transaction. In addition there is a need for a monitoring system to assure investors that their investment is being managed in a prudent manner. The intermediary could fulfil this role on a fee for service basis.

Small Business Equity Corporations

In May of 1984 the Government of Alberta announced the Small Business Equity Corporation (SBEC) program to assist in meeting some of the needs described above. The program is modelled after similar programs in the United Kingdom, the United States and Ontario's Small Business Development Corporation program.

Under the SBEC program investors place a minimum of $100,000 into an investment company, the SBEC. A trust fund is established and 30% of the investment capital of the SBEC is withheld and placed in trust to be released when the remaining 70% has been invested in eligible companies. The investors receive a grant (or a tax credit in the case of a corporate investor) equal to 30% of their investment in the SBEC. The SBEC may purchase up to 49% of the equity (voting) shares in a company.

While the program is administered and paid for by the provincial government the government acts only as a facilitator in the transaction between the investor and the company to be invested in. There is no guarantee of return on investment by the Province nor does the Province endorse any particular business as being a good investment opportunity. In this regard the investor still has the onus of researching a particular company's background and determining the viability of the proposed investment. The cost of this kind of research is the same for a a large company as for a small company and therefore there is a tendency to stick with larger more well-known businesses. The grant or tax credit

acts as an incentive to research smaller, less well-known companies.

The advantages to the investor, beyond the immediate tax credit, include the opportunity to receive income in the form of dividends based on the performance of the company, as well as the potential for capital gains. For the small business the replacement by patient equity capital of debt capital with a fixed repayment schedule is a direct benefit. Indirect benefits may include access to expertise from participants in the SBEC and tightened financial control of the business due to increased financial reporting requirements and practices.

The performance of the program to date has exceeded expectations. Initial funding for the program was $15,000,000 and was to cover a four year period. Demand was so great that the budget had been exhausted within a six month period and a further $35,000,000 was allocated. This additional funding was used up in a two month period and since May of 1985 no further funds have been allocated. The total of $50,000,000 represents approximately $160,000,000 in additional equity capital invested in small Alberta businesses.

Currently about 450 SBEC's are active. Only about $7,000,000 of the funds available have been invested in about 30 agribusinesses including farms.[8] The reasons for this are speculative but may include a reluctance on the part of farmers to take on additional shareholders even though they retain control; interpretation of the Act to preclude family investment in a farm corporation;[9] or it may simply be the case that farmers are unaware of the program or the potential it has for

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[8] These figures are estimates as of July 1986 supplied by Alberta Tourism and Small Business.

[9] Investment in a small business by an SBEC must be at arm's length. The regulations state that an SBEC cannot invest in a small business if any shareholder of the SBEC holds any shares in the small business. Likewise the arm's length provision prevents investments in small businesses that are 'associated' with the SBEC.

their businesses.

Alberta Stock Savings Plan

A similar program, only recently approved, is the Alberta Stock Savings Plan (ASSP). The plan provides a 30% tax savings for an investment in the shares of eligible companies. The Plan provides for three categories of companies; emerging (speculative), expanding and mature, classified according to assets and revenues. The ASSP does not appear to have the same potential for agriculture as the SBEC as it will require that shares be publicly traded. Few agri-businesses will likely satisfy this criterion nor are they likely to be prepared to meet the expense of a public share issue.

Farm Investment Corporation

A 1959 publication (Elofson and Miller) outlines problems similar in nature, if not scope, to the present problems facing agricultural finance. The authors propose the formation of a privately held farm land investment and management corporation. The company would purchase several farms using capital raised by issuance of Class A shares. The farms would then be leased to farmers who could purchase shares in the equity of the farm being leased (Class B shares). Over time the tenant could obtain sufficient Class B shares to acquire conventional financing and purchase the farm. The authors suggest that a typical corporation might hold fifty farms and that it would take 12.5 years for the farmer to acquire sufficient Class B shares to purchase the farm. The corporation would therefore need to acquire about four farms per year using the proceeds from the disposal of Class B shares.

Income to the corporation would take the form of earnings per share calculated after allowing for wages to the operator and a

management fee to the corporation or using a wage for labor and an opportunity cost on capital. The opportunity cost approach is more favourable to the tenant than to the corporation. Elofson and Miller (E&M) state that:

> "from the point of view of economic theory, the second procedure would be preferred. It would reward the tenant for his labors at the wages he would receive as a hired man . . . Both wages and interest rates could be varied with market conditions. The division of the net balance equally between the contracting parties would reward the tenant for a superior job of farming and encourage him to improve his managerial skills" (p. 27-28).

Three major obstacles to this corporate approach to equity financing are foreseen by E&M:

1. legal obstacles such as restrictions on corporate ownership of farmland,
2. problems in selling sufficient stock to finance 50 or more farms,[10] and
3. the initial expense of establishing and operating such a holding corporation until income begins to flow to it" (p. 39).

The SBEC approach may partfally solve the second problem and, in Alberta at least, the first is not a problem. As to the expense of establishing the corporation perhaps involvement of the government sector is required.

Farm Development Corporation

The recent proposal by the Farm Credit Corporation (Ashmead 1986) is an apparent attempt to overcome the second and third obstacles envisioned by Elofson and Miller namely the problems in selling sufficient stock and the initial expense of establishing and operating the holding corporation. Under this scheme farmlands repossessed under foreclosure activities by credit institutions, such as the FCC and the chartered banks, would be transferred to the proposed Farm Development Corporation (FDC). Farmers wishing to refinance could also sell some of

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[10]This was with reference to $50,000 farms. The problem is many times greater given today's capital requirements.

their assets to the FDC, restructure financially by retiring existing debt, and lease-back their farms until such time as they are in a position to reacquire complete ownership.

The proposal calls for a government guarantee to the investors (credit institutions) which would overcome the difficulty with a lack of profitability in the initial stages. Because the land involved has already been acquired by virtue of default on previous debt contracts the second obstacle has also been eliminated.

The proposal calls for the establishment of the purchase price (aquisition price) for farmlands offered to the FDC by capitalizing the net operating income of that farm. Aside from difficulties involved in adjusting for other influences on land values not reflected in the income approach to appraisal, the procedure is a step in adjusting asset values to more realistic levels. Choice of an appropriate discount rate, as discussed in Chapter 3, is critical to establishment of a realistic value and must reflect the earning potential of the asset.

Boehjle (1985) sees the possibility of debt holders assuming an equity position in distressed farms as a possible policy response to financial difficulties. Other alternatives suggested are similar to the FDC and the E&M proposal.

Policy Considerations

A problem that has been overlooked in both proposals is the reaction of the rural community, and society in general, to the idea that the government or some private corporation should own farmland. This is reflected in the existence of legislation in some jurisdictions which prohibits foreign or absentee ownership or ownership by corporations. The real estate division of Canadian Pacific, Marathon Realty, has an extensive portfolio of farmlands in both Saskatchewan and

Alberta. The company has been in the business of leasing and managing farmlands for over a hundred years. It is indicative of the prospects for this kind of company that provisions of the Saskatchewan Farm Ownership Act will limit Marathon's holdings to ten acres by the early part of the next decade. Boehlje (1985) suggests that one of the major foreseeable policy considerations is a review and reassessment of these kinds of legislation in the context of current difficulties.

Proposals such as Farm Development Corporation are dependent on the involvement of government to guarantee investor returns. The Saskatchewan Land Bank was essentially the same as the FDC proposed by Ashmead with the notable difference that farmers could choose to sell to the government. The Land Bank had mixed reviews and was eventually disbanded. The FDC is a means for credit institutions to realize some revenue (guaranteed by the Treasury) on lands which are reluctantly held in the asset portfolio of the institution. Credit institutions are in the business of lending money not managing farms. Institutions such as Credit Foncier with its extensive farmland portfolio are the exception rather than the rule. Even Credit Foncier has in recent years begun to dispose of their investment in farmlands. Neither the FDC nor the E&M proposal appear to offer much in keeping with the 'family farm' definitions, at least not without separation of ownership and control, and certainly not in the short run. Neither proposal is likely to be acceptable to the rural community. Both proposals require enabling legislation to remove restrictions on land ownership and, perhaps more importantly for society, to be able to control and regulate development of this kind of corporate farm.

In terms of maintaining some recognizable 'family farm' structure the SBEC approach seems to be a more acceptable approach to equity financing agriculture. By law the SBEC cannot control a majority

interest in the company which would leave 51% of the ownership and all of the control with the farm operator. As such there should be little problem with ownership legislation. While it is possible that the SBEC may wish to invest in a portfolio of farms, E&M's second obstacle is likely to prevent any large scale development in this area. Investment is likely to be restricted to an individual farm and, with reference to E&M's obstacle three, the farm will already have to be profitable or nearly profitable to attract investor interest in the first place. No further government guarantees should be required nor should any other enabling legislation be required.

While legally the SBEC approach can proceed immediately one obstacle is the lack of information and knowledge on the part of both investors and farmers. Equity financing has been shown to potentially offer some advantages to both the farmer and the investor. Resistance to the concept however is likely to be great even though farms suitable for equity financing will be the most productive, efficient and progressive farms. As the Deputy Minister of Agriculture pointed out in a recent speech to the Conference on Money Management:

> "For most farm businesses, a major change in organization and control would have to be effected before they could achieve eligibility under the program. In many cases such a change would have to include a change in personal business philosophy as well. Finally, the farm business would need to demonstrate profitability relative to other investment opportunities being considered by the corporations." (McEwen, 1986).

Regardless of profitability, only about 5% of Alberta farms are eligible under the program due to an existing corporate structure.

Use of equity financing will not be an appealing vehicle to assist farms in financial difficulty unless the equity investor is the government or is guaranteed a return by the government. Equity financing if used on a larger scale could conceivably release debt funds to the market which could be reborrowed by beginning farmers or farmers in

difficulty. At best the benefit to the industry in this regard would be slight. Equity financing will only be workable, or appeal to, the very top producers who in many cases use little debt capital anyway. From the investor's viewpoint there is little to attract an investment in a farm in financial difficulty unless it is the potential for a tax loss. Agriculture in general will be in a sad state when the only incentive for investment is to shelter income earned elsewhere from taxes.

Boehlje (1985) summarizes the policy problems facing agriculture:

> "A final role of public policy in the current environment would be one of providing information to facilitate the adjustment process. Programs to facilitate the merger of business firms, to retrain and relocate people, and to disseminate the best information on adjustment strategies and resource availability might make the adjustments less painful for those involved. However it is not clear that such programs would be an adequate response to the current financial problem in agriculture."

To Boehlje's comments it might be added that programs and policies in response to financial stress must not concentrate solely on the liability and equity portions of the balance sheet. The preoccupation and efforts of policy-makers could profitably be redirected to designing and implementing the orderly adjustment of asset values rather than reducing the cost of credit and artificially sheltering agriculture from market determined rates of interest. Programs such as the Farm Transition Program are a much needed step in the right direction. Further assistance in making the reallocation of resources, from agriculture to other sectors of the economy, as painless as possible would likely be of more immediate benefit than programs which only delay the inevitable.

6. Conclusions and Recommendations

The hypothesis to be tested was stated at the outset as:

> Use of external equity in the financing of farm businesses can have beneficial effects on financial outcomes by reducing risk and increasing both survivability and growth rates. External equity may be incorporated in a number of forms which may affect the outcomes.

The analysis presented in Chapter 4 indicated that, while risk is reduced through the use of equity financing, little can be inferred about the hypothesis that survivability increased. None of the trials produced any failures, in the context of failure used here, yet the financial health of many of the highly levered cases was less than robust. In addition the interpretation of financial ratios such as the leverage ratio in the lease trials requires some caution as the ratios can be misleading. However, on the basis that risk levels are reduced through the use of equity financing it may be possible to conclude that the probability of survival is increased, all other things equal.

Analysis of the results by investment level using stochastic dominance as a selection criterion indicated that the equity options would not be the preferred method of financing except at the lower levels of equity. At the 75% level the partnership is the only equity option admissible among the possible options. At the 50% level neither of the equity options is admissible for the farmer which automatically excludes the non-farm partner. Only at the 40% and 25% levels are the equity options not dominated by some of the debt financed results. The conclusion that must be drawn is that the the use of debt capital at levels at or below 50% of total assets more than adequately increases the returns with respect to the risk involved. As debt use and the associated risk rises, equity financing becomes more viable. It is important to note that if control of the farm is to remain in the hands of the farmer, ownership of the investor's portion of the total assets

would have to be diluted among many investors. The likelihood of achieving sufficient dilution among investors seems remote when the small scale of most farm businesses is considered.

Different ownership structures did not have a major impact on the results. The most noticeable difference was the difference in the returns between the CORP100 and the SP100 which was rooted in taxation regulations. Of more impact was the use of debt regardless of the structure under which it was used.

Equity financing is seen to have limited scope for use in agriculture without major restructuring in business control, organization and philosophy. It will likely meet with resistance from the farm sector because it may involve changes to the 'family farm' by separating the control of farm assets from ownership.

Aside from the kinds of structural changes that may be required equity financing will only be viable under very specialized economic conditions. The results from the model indicate that the farm investment was less risky but had lower returns than an investment in a stock portfolio on the Toronto Stock Exchange over a comparable period. It must be remembered however, that a large portion of the return in the case farm is attributable to large increases in asset values prior to 1981. In addition, the management skills on the case farm are far above typical levels. The question arises as to how attractive agriculture investment would be in the absence of asset appreciation and at more typical levels of management and hence, profit.

Equity financing does offer some benefits to the farmer by reducing the level of risk by removing the riskiness associated with use of debt capital. By foregoing the use of debt at 'moderate' levels however, any beneficial impact of leverage is also eliminated. At the same time however, the use of equity capital stabilizes returns by

eliminating the downside of leverage.

Returns to the investor in the model tended to be sensitive to the taxation rate. With some tax planning the rate of return to the investor could likely be improved. The major attraction of an agricultural investment to a non-farm investor appears to be the opportunity for diversification of an investment portfolio.

In recent months the popular press has contained numerous references to equity financing. Some of the proposals discussed include leasing arrangements, land management companies, franchising and other variations on similar themes. What most of these 'proposals' fail to recognize is that profitability on an investment is a prerequisite to attracting private investors. As shown by the results here, the level of profitability on a top farm compares only marginally with other alternative investments. Many of the so-called equity financing 'proposals' are simply new names for existing practices prevalent to some degree in the farm sector today. Leasing of farmland already separates ownership and control. Recent estimates (Petersen) are that as much as 30% of all farmland in Alberta is operated under various forms of lease. Leasing, however, is not equity financing.

Land leasing and land management companies are both new and old. The real estate division of Canadian Pacific, Marathon Realty, has an extensive portfolio of farmlands in both Saskatchewan and Alberta. The company has been in the business of leasing and managing farmlands for over a hundred years. Credit Foncier has held a similar portfolio for a number of years. When private companies, such as Marathon Realty and Credit Foncier, are choosing to divest themselves of their agricultural land portfolio, presumably because of low returns as well as adverse legislation, the prospects for any large scale development in this regard are slight. Proposals such as Farm Development Corporation (the

fixed rate lease proposal) are dependent on the involvement of government to guarantee adequate investor returns. As a vehicle for lending institutions to manage an increasingly larger portfolio of foreclosed land, and as a vehicle to offer assistance to farmers facing foreclosure, the proposal has some merit. As an equity financing scheme however, the essential element of profitability is lacking.

Successful franchising is dependent on product differentiation and/or on an intensive level of management. While the concept of product differentiation is attractive if one is in the business of selling hamburgers, success depends on advertising and marketing. It is not likely that, on a typical wheat or hog farm, any appreciable degree of product differentiation is likely to occur regardless of the amount spent on advertising. Farm management specialists, government extension agencies and others have succeeded to some degree in raising the general level of management skills on farms. However it has taken years to achieve and only in certain exceptional instances has more intensive management been adopted successfully.

Almost all of the discussion in the area of farm finance has revolved around adjusting either the liabilities or equity part of the farm balance sheet. Subsidized interest rates, debt write-down provisions and debt moratoria are only treatments for the symptoms of the problem. The fundamental cause is that the prices paid for assets, primarily land, are far in excess of prices which can be sustained at current or foreseeable returns. If a farmer cannot pay for $100,000 land at a market interest rate of 12% - but can afford the payments at a subsidized rate of 6% - then logic (and mathematics) says that the payments can be made if the land were priced at $50,000. Similarily, if the return on $100,000 worth of assets in agriculture is only 5% that return would be 10% if the value of assets were to fall by half.

The interest in equity financing today has arisen because of the inability of agriculture to service existing debt. A return to the conditions of the late seventies would undoubtedly remove much of the demand for external equity financing. Unfortunately it is unrealistic to think that an equity investor should be willing to participate in a farm enterprise during the tough times and not in the good times. Little evidence exists to show that there was any significant demand or need for additional equity during the late seventies. Perhaps, as asset values continue to decline to more realistic levels, the missing element of profitability will attract equity investors to agriculture. However, until agriculture can show a profit based on operating margins rather than dependent on asset appreciation, that is not likely to happen. Some equity investors may be attracted to an agricultural investment as a means of diversifying their investment portfolio. Due to the lack of correlation between the stock market and agriculture the risk in a portfolio which includes an agricultural investment is less than in a specialized portfolio. Some farmers may also want to consider equity investment in the stock market as a means of minimizing their risk.

A. Suggestions for Further Research

The results obtained here are based on a case study approach using historic data. The results from the model are a function of the enterprise combination, and level of management, on the case farm and the nature of asset appreciation and depreciation which occurred over the trial period. Decisions regarding profit distribution and taxation, where necessary in the model, tended to favour the farm operator. Expansion of the simulation aspects of the model by incorporating Monte Carlo techniques would provide much additional flexibility in the interpretation of results.

The taxation scheme applied to income received by the investor was simplified and restrictive. An area needing further exploration is the impact of the taxation system on the investor and the potential for tax management strategies within the selected business structure.

The case farm is a relatively specialized operation. Alternative enterprise combinations allowing for more diversification on the farm may improve the returns for both investor and farmer. The application of the Capital Asset Pricing Model to the trade-off between risk and return in agriculture needs to be explored in depth. Application of portfolio theory concepts to farm securities will be required if more farms incorporate and issue stocks. The beta of farms with different enterprise combinations and the TSE may be quite different and affect the composition, the expected return and the risk in the market portfolio selected. Exploration of the correlation coefficients between farms with different enterprise combinations may indicate that two farms in a joint venture are less risky than either farm operated separately. If this were the case then grain farmers would be able to diversify by investing in their neighbours' hog farm and vice versa.

The data upon which the model is based reflect four years in which asset values appreciated followed by four years in which values declined rapidly. Income levels also tended to correspond with years in which asset values increased markedly. The impact of those conditions needs to be explored further. Determination of the sensitivity of the results to different patterns of asset value appreciation or depreciation, different levels of revenue through variation in prices and yield or different levels of expenditure on operating expenses including interest costs would provide additional useful information.

Much of the current discussion in the area of farm finance revolves around adjustment of the liability and equity components of the

farm balance sheet. Would the results of the model be significantly different if asset values were set at levels reflecting the earning potential of the asset?

The concept of equity financing, while in some respects differing little from many of the existing practices in the farm community, in many other respects is a radical alternative to existing farm structures. Given the current notions about the desirability of the 'family farm' structure, many of the prevalent attitudes and philosophies on the part of members of the rural community and legislators will need to be examined. If policies designed to facilitate equity investment in agriculture are to be developed an educational process will need to be developed and followed. As a starting point attitudes toward equity investment will need to be determined. Many of society's concerns, which have dictated that the 'family farm' is the preferred organizational structure, can still be satisfied provided that control of farm assets rests with those engaged in production. Ownership and control need not be synonymous terms.

Bibliography

1. Alberta Agriculture. **Farm Business Partnerships.** Farm Business Management Branch, 1980.

2. Alberta Agriculture. **Farm Business Incorporation.** Farm Business Management Branch, 1985.

3. Alberta Agriculture and Deloitte Haskins and Sells. **Tax Management Strategies for Alberta Farmers.** Farm Business Management Branch, 1984.

4. Alberta Land Use Forum. "The Family Farm in Alberta - Its Origins, Development and Future." Technical Report No. 1. 1974.

5. Anonymous. **The Scriptures According to CANFARM.** Guelph, 1977. (unpublished)

6. Archer, Stephen W. and Charles A.D. Ambrosio. **The Theory of Business Finance - A Book of Readings.** 2nd Edition. Collier Macmillan Publishers. 1976.

7. Aplin, R. D., George L. Casler and Cheryl P. Francis. **Capital Investment Analysis.** Grid Publishing, Inc., Columbus, Ohio. 1977.

8. Ashmead, R. "Is More Debt Financing the Answer to Farmer's Financial Problems." Farm Credit Corporation, Ottawa, 1983. (unpublished)

9. _____ "Financing Alternatives for Canadian Agriculture." Farm Credit Corporation, Ottawa, 1986.(unpublished)

10. Aukes, Robert G. "Study of Long-term Debt Instruments for Canadian Agriculture," Agriculture Canada, Development Policy Directorate, Ottawa. March, 1983 (unpublished)

11. _____ **An Economic/Accounting Approach to Farmers' Income and Capital.** Research Bulletin 85-2. Department of Agricultural Economics and Farm Management, Faculty of Agriculture, University of Manitoba. September, 1985.

12. Babb, E. M. "Some Causes of Structural Change in U.S. Agriculture." in **Structure Issues of American Agriculture: Setting Farm Production, Public Policy and Marketing in Rural America** United States Department of Agriculture Agricultural Economic Report #438, November, 1979, pp.51-59.

13. Barry, P.J., J.A. Hopkins and C.B. Baker. **Financial Management in Agriculture.** 2nd Edition, 1979, Interstate Printers - Publishers Inc., Danville, Illinois.

14. Bauer, L. "Farm Properties as a Capital Investment." AIM 27.3:16-28, August, 1983. Appraisal Institute of Canada, Winnipeg, Manitoba.

15. Baum, K.H. and Lyle P. Schertz. (Eds.) **Modelling Farm Decisions for Policy Analysis.** Westview Press, 1983.

16. Boehlje, Michael. "Non-Institutional Lenders in the Agricultural Credit Market." Agricultural Finance Review 41:50-57, July, 1981.

17. _____ "An Assessment of Alternative Policy Responses to Financial Stress in Agriculture." Agricultural Economics Research 85-2 Cornell University Agricultural Experiment Station, Ithaca, New York, January, 1985.

18. _____ and David Reinders. "The Impact of Selected Income Tax Provisions on Land Values." Journal of the American Society of Farm Managers and Rural Appraisers 47.1:37-42, April, 1983.

19. Boxley, Robert F. "Ownership and Land Use Policy." in **Structure Issues of American Agriculture: Setting Farm Production, Public Policy and Marketing in Rural America.** United States Department of Agriculture Agricultural Economic Report #438, November, 1979, pp. 161-167.

20. Brealey, Richard and Stewart Myers. **Principles of Corporate Finance.** McGraw-Hill, New York, 1981.

21. Brake, John R. "Financing Agriculture in the Future." The Farm and Food System in Transition: Emerging Policy Issues Cooperative Extension Service, Michigan State University, East Lansing, Michigan, 1983.

22. Brewster, David. "The Family Farm: A Changing Concept." in **Structural Issues of American Agriculture** United States Department of Agriculture Agricultural Economic Report #438, November, 1979, pp. 74-79.

23. Brigham, Eugene I. and Louis C. Grapinski. **Intermediate Financial Management.** Dryden Press, Chicago, 1985.

24. Brinkman, George L. **Farm Incomes in Canada,** Economic Council of Canada, Ottawa, 1981.

25. Canadian Bankers Association. **Economic Trends in Canadian Agriculture.** Toronto, 1984.

26. CANFARM. **Farm Business Analysis Manual.** Canfarm, Guelph, 1972.

27. Carlyle, William J. "The Changing Family Farm on the Prairies." Prairie Forum, Vol. 8, No. 1, Spring, 1983.

28. CANSIM. "Selected Monthly and Quarterly Canadian Bond Yield Averages and Other Interest Rates - Government of Canada Bond Yields." Series 002560.3.

29. _____ "Toronto Stock Exchange Stock Price Index - Composite Close." Series 000161.3.1

30. _____ "Toronto Stock Exchange Stock Price Index - Stock Dividend Yields." Series 002566.41.

31. Centre for Agricultural Strategy **Capital For Agriculture.** CAS Report #3 March 1978. University of Reading, England.

32. Dean, Kay. "Household Cost Survey for Six Case Study Farms, County of Stettler." Alberta Agriculture, 1983.

33. Dewey, J. **Logic: The Theory of Inquiry.** Holt, Rinehart and Winston Inc. New York: 1938.

34. Ellinger, Paul N., Peter J. Barry and David A. Lins. "Farm Financial Performance Under Graduated Payment Mortgages." North Central Journal of Agricultural Economics 5.2:47-53, July, 1983.

35. Elofson, Don O. and Frank Miller. "Equity Financing in Agriculture." Research Bulletin #714, University of Missouri, College of Agriculture, Agricultural Experiment Station, Columbia, Missouri, October, 1959.

36. Farm Credit Corporation. **Farm Credit in the Canadian Financial System.** Research Division, Ottawa, n.d.

37. Farm Credit Corporation. **1984 Farm Survey** Research Division, Ottawa, 1985.

38. Grisley, William and Matthew C. Grady "Equity Levels Necessary for Successful Entry into Dairy Production." Agricultural Finance Review 44:49-57, July, 1984.

39. Halbrook, Steve A. "Dealing with Institutional and Legal Information in Models of the Farm Firm." in Kenneth W. Baum and Lyle P. Schertz (Eds.) **Modelling Farm Decisions for Policy Analysis.** Westview Press, Boulder Colorado, 1983, pp. 135-145.

40. Hirshleifer, J. "On the Theory of Optimal Investment Decision." Journal of Political Economy. August, 1958. pp. 329-352.

41. Hatch, James E. **Investment Management in Canada.** Prentice-Hall Canada Inc., Scarborough, 1983.

42. Hicks, J. R. **Value and Capital** 2nd Edition, Clarendon Press, London. 1946.

43. Jones, J.V.H. "Equity Share Mortgages - Do They Have a Future?" Farm Management 5.3:1-5, Autumn 1983.

44. Knutson, Ronald D. and James Richardson. **Refinancing Agriculture.** Agricultural and Food Policy Center, Texas A & M University, College Station, September, 1984.

45. Klein, K. K. and R. Barichello. **Farm Finances in Western Canada.** Canada West Foundation, Calgary, 1985.

46. Kremeniuk, T. "Capital Demand on the Modern Farm." Agrologist Agricultural Institute of Canada, Summer, 1983.

47. Legislative Assembly of the Province of Alberta. Small Business Equity Corporations Act. Queen's Printer, Edmonton, 1984.

48. Lins, David A. "Life Insurance Company Lending to Agriculture." Agricultural Finance Review 41:41-49, July, 1981.

49. _____ "Credit Availability Effects on the Structure of Agriculture." in **Structure Issues of American Agriculture: Setting Farm Production, Public Policy and Marketing in Rural America** United States Department of Agriculture Agricultural Economic Report #438, November 1979, pp. 134-142.

50. Looney, J.W. "Tax and Other Legal Considerations in the Organization of Farm Firms." in Kenneth W. Baum and Lyle P. Schertz (Eds.) **Modelling Farm Decisions for Policy Analysis.** Westview Press, Boulder, Colorado, 1983. pp. 135-145.

51. Lu, Yao-Chi. "Technological Change and Structure." in **Structure Issues of American Agriculture: Setting Farm Production, Public Policy and Marketing in Rural America** United States Department of Agriculture Agricultural Economic Report #438, November, 1979, pp. 121-127.

52. McEwen, H.B. "The Case for Equity Capital." Address to the Conference on Money Management. Calgary, January 16, 1986.

53. Melichar, Emmanuel. "Capital Gains Versus Current Income in the Farming Sector." American Journal of Agricultural Economics 61:1085-1106, December, 1979.

54. _____ "Farm Wealth: Origins, Impact, and Implications for Public Policy." Agricultural Economics Research 83-40. Cornell University, Agricultural Experiment Station, Ithaca, New York, 1984.

55. Modigliani, Franco and Merton W. Miller. "The Cost of Capital, Corporation Finance, and the Theory of Investment." American Economic Review. June 1958, pp. 261-97.

56. _____ "The Cost of Capital, Corporation Finance and the Theory of Investment: Reply." American Economic Review September 1958, pp. 655-69.

57. _____ "Taxes and the Cost of Capital: A Correction." American Economic Review. June 1963, pp. 433-443.

58. Morgenthaler, G.W. "The Theory and Application of Simulation in Operations Research." in R. L. Ackoff (Ed.) **Progress in Operations Research.** John Wiley, New York, 1961.

59. Mumey, Glen A. **Canadian Business Finance** Irwin-Dorsey Limited. 1977.

60. Naylor, T.H., J.L. Balintfy, D.S. Burdick and K. Chu. **Computer Simulation Techniques.** John Wiley, New York, 1966.

61. Northrup, F.S.C. **The Logic of the Sciences and the Humanities.** MacMillan Co. New York: 1947.

62. Ontario Ministry of Agriculture and Food. "Agricultural Credit: An Innovative Look at Canadian Needs for the Future." Ministers' and Deputy Ministers' of Agriculture Conference, Winnipeg, Manitoba, July, 1984. (unpublished)

63. Patrick, George F. and Ludwig M. Eisgruber. "The Impact of Managerial Ability and Capital Structure in Growth of the Farm Firm." American Journal of Agricultural Economics, 50:491-506, August, 1968.

64. Pederson, Glenn D. "Machinery Lease Versus Purchase Decisions Under Risk." Agricultural Finance Review 45:72-80, July, 1985.

65. Penson, John B. and Marvin Duncan. "Farmer's Alternatives to Debt Financing." Agricultural Finance Review 41:83-91, July, 1981.

66. Petersen, T.A. "Our Land - Who Owns It and Who Farms It." Agriculture and Forestry Bulletin, 6.4:62-66, December, 1983.

67. Perry, Gregory M., M. Edward Lister, James W. Richardson, and David F. Leatham. "The Effects of Equity Position, Credit Policy and Capital Grants on Farm Survival." Agricultural Finance Review 45:58-71, July, 1985.

68. Phillips, J.B. "Statistical Methods in Systems Analysis." in J.B. Dent and J.R. Anderson (Eds.) **Systems Analysis in Agricultural Management**, John Wiley & Sons Australiasia Pty. Ltd., 1971.

69. Revenue Canada Taxation **Taxation Statistics.** Various Editions 1977 - 1985. Canadian Government Publishing Centre, Supply and Services Canada, Ottawa.

70. Richardson, James W., Catherine M. Lemieux and Clair J. Nixon. "Entry into Farming: The Effects of Leasing and Leverage on Farm Survival." Southern Journal of Agricultural Economics December, 1983, pp.139-145.

71. Ibbotson, Roger G. and Rex H. Singuefield. **Stocks, Bonds, Bills and Inflation: The Past the and Future.** Charlottesville, Va.: The Financial Analysis Research Foundation, 1982.

72. Scofield, William H. "Non-Farm Equity Capital in Agricuture." Agricultural Finance Review 33:36-41, July, 1972.

73. Skees, Jerry R. and Donald W. Reid. "Consideration of Farmland Value Variation on Farm Firm Survival." **Agricultural Finance Review** 44:67-72, July, 1984.

74. Smale, Melinda, William E. Sanpe, and Pricilla Salent. "Farm Family Characteristics and the Vaiability of Farm Households in Wisconsin, Mississippi and Tennessee." Agricultural Economics Research, 38.2:11-27, Spring, 1986.

75. Smith, G. Scott, Wesley N. Musser and Fred C. White. "An Analysis of the Effects of Farm Size and Expansion Decisions on the Financial Conditions of Farm Firms in South Georgia." Research Bulletin 321, University of Georgia, College of Agriculture Experiment Station, December, 1984.

76. Statistics Canada. **Farm Wages in Canada.** Catalogue #21:002, Vol. 46, No. 2. Ministry of Supply and Services, Ottawa, July, 1985.

77. Stratton, R. "Share Farming in Britain." Farm Management 5.1:1-6, Spring, 1983.

78. Task Force on Agricultural Finance. **Report.** (Document 830-156/011) "Report Mechanisms to Provide Stability of Interest Costs in the Agricultural Sector", Toronto, November, 1984.

79. Tate, W. B. "Trends and Alternatives in Farmland Investment." **Farm Management** 5.5:197-203, Spring, 1984.

80. Van Horne, James C. **Financial Management and Policy.** 6th Edition, Prentice Hall, Englewood Cliffs N.J., 1983.

81. Wright, A. "Farming Systems, Models and Simulation." in J.B. Dent and J.R. Anderson (Eds.) **Systems Analysis in Agricultural Management.** John Wiley & Sons, Australasia Pty. Ltd., 1971. pp.17-33.

82. Wright, A. and J.B. Dent. "The Application of Simulation Techniques to the Study of Grazing Systems." Australian Journal of Agricultural Economics 13: 144-153, 1969.

APPENDIX

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

CASHFLOW STATEMENT

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
CASH INFLOW										
Cash Operating Revenue	0	90357	115185	114771	121227	138907	144755	92221	114774	136566
NON-OPERATING INFLOW										
Machinery Sales	0	6121	2442	0	23008	30224	2277	604	0	4100
Building Sales	0	0	0	0	0	0	0	0	0	0
Land Sales	0	0	0	0	0	0	0	0	0	0
Other Asset Sales	0	0	0	0	0	0	0	0	0	0
Term Cap. Borrowed	207637	0	0	0	0	0	0	0	0	0
Contributions	207638	0	0	0	0	0	0	0	0	0
Investment Liquidation	0	0	0	0	0	0	0	0	0	0
Non-operating Inflow	415275	6121	2442	0	23008	30224	2277	604	0	4100
TOTAL CASH INFLOW	415275	96478	117627	114771	144235	169131	147032	92825	114774	140666
CASH OUTFLOW										
Cash Operating Expense	75505	70780	92977	90167	92794	108667	108267	105909	119812	127394
NON-OPERATING OUTFLOW										
Machinery Purchases	94770	0	18534	0	49162	84173	12900	5089	12786	30940
Building Purchases	80000	28686	0	9883	0	0	0	0	0	0
Land Purchases	145000	0	0	0	0	0	0	0	0	0
Other Asset Purchases	0	0	0	0	0	0	0	0	0	0
Term Credit Repaid	0	1957	2163	2391	2642	2919	3226	3564	3938	4351
Withdrawals	0	0	0	0	0	0	0	0	0	0
Income Tax	0	0	773	500	266	1325	2268	348	0	0
Investments Made	0	0	0	0	0	0	0	0	0	0
Non-operating Outflow	319770	30643	21470	12774	52070	88417	18394	9001	16724	35291
Total Cash Outflow	395275	101423	114447	102941	144864	197084	126661	114910	136536	162685
SURPLUS/DEFICIT	20000	-4945	3180	11831	-629	-27953	20371	-22085	-21762	-22019
Beginning Cash Balance	0	500	500	500	500	500	500	500	500	500
LESS: Op. Capital Repaid	0	0	0	0	0	0	0	0	0	0
LESS: Term Deposit Made	19500	0	3180	11831	0	0	20371	0	0	0
PLUS: Term Dep. Redeemed	0	4945	0	0	629	27953	0	21354	0	0
PLUS: Op. Cap. Borrowed	0	0	0	0	0	0	0	731	21762	22019
End Cash Balance	500	500	500	500	500	500	500	500	500	500
ACUM TERM DEPOSITS:	19500	14555	17735	29566	28936	983	21354	0	0	0
ACUM OPERATING LOAN:	0	0	0	0	0	0	0	731	22493	44511

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

REVENUE

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
wheat	0	0	0	0	0	0	0	0	0	0
barley	0	19132	9979	21632	28193	30772	19242	13161	4478	28361
oats	0	0	0	1065	0	0	0	0	0	0
rapeseed	0	0	0	0	0	0	0	0	0	0
flax	0	0	0	0	0	0	0	0	0	0
forages	0	0	0	1200	0	0	0	0	0	3312
Canadian Wheat Board	0	1272	1710	891	1004	6993	3957	77	1664	3951
crop insurance	0	0	0	0	0	0	20105	389	9544	0
other crop income	0	150	141	662	960	0	762	850	384	0
Total Crop	0	20554	11830	25450	30157	37765	44066	14477	16070	35624
cows & bulls	0	0	15203	0	0	0	0	0	0	0
feeders & calves	0	0	0	0	11381	10863	11520	12225	15303	17069
finished cattle	0	5341	0	14321	0	0	0	0	0	0
sows, boars, & gilts	0	2569	1740	3264	3005	2412	2747	1598	1452	4270
weaners & feeders	0	0	0	0	0	0	0	50	0	0
finished hogs	0	59337	85140	68903	62820	72732	81730	60261	80690	69899
other livestock	0	0	0	846	0	0	0	0	0	0
Total Livestock	0	67247	102083	87334	77206	86007	95997	74134	97445	91238
custom work	0	0	0	0	0	0	0	260	0	1665
Term interest	0	1429	1272	1906	3678	4618	136	2135	0	0
other income	0	1127	0	81	10186	10517	4556	1215	1259	8039
OPERATING REVENUE	0	90357	115185	114771	121227	138907	144755	92221	114774	136566
LESS: Non-Cash Revenue	0	0	0	0	0	0	0	0	0	0
Am't Sold on Cr.	0	0	0	0	0	0	0	0	0	0
PLUS: Amt.Rec.on Acc't	0	0	0	0	0	0	0	0	0	0
CASH OPERATING REVENUE	0	90357	115185	114771	121227	138907	144755	92221	114774	136566

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

EXPENSES

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
herbicides	0	769	2047	5311	4669	5084	5229	5606	6397	6576
fertilizer	0	3772	9507	8631	7263	9383	17788	8206	8924	18320
seed	0	342	294	551	405	288	145	257	191	140
crop insurance	0	1686	1628	1633	2165	2592	3864	3582	1837	4254
other crop supplies	6795	12	0	0	4	0	0	0	0	0
Total crop expenses	6795	6581	13476	16126	14506	17347	27026	17651	17349	29290
cattle purchases	0	3227	12369	14745	0	8830	9783	10990	13828	16178
hog purchases	36610	0	300	770	8827	1225	1000	0	1325	0
other livestock purchase	0	0	0	0	1450	0	0	0	0	0
grain,forage,& suppl't	32100	15162	18157	12926	15805	18659	15016	19467	18693	15147
veterinarian & medicine	0	300	590	582	350	656	386	312	327	506
other livestock expense	0	0	0	0	0	0	0	0	0	0
Total livestock expense	68710	18689	31416	29023	26432	29370	26185	30769	34173	31831
fuels & lubricants	0	1959	2122	2107	4170	7099	6166	7621	7428	7016
equipment repairs	0	4126	2384	5284	4729	8455	4784	5000	7540	9022
building repairs	0	2328	853	387	0	0	0	0	0	0
labour	0	2609	2448	2821	6326	5592	5241	4123	9748	4252
custom work	0	0	3693	34	0	0	0	35	159	321
Operating Interest	0	0	0	0	0	0	0	0	99	2812
Term interest	0	21596	21369	21118	20841	20534	20196	19821	19408	18951
utilities	0	2181	3463	2823	2724	2745	3187	3800	4489	6099
property taxes	0	752	836	884	1184	1217	1461	1361	1244	1354
land rent	0	0	0	0	0	0	0	0	0	0
other supply & service	0	2372	2895	1088	2933	6642	3719	4787	6730	4446
manager's salary	0	7587	8022	8472	8949	9666	10302	10941	11445	12000
OPERATING EXPENSE	75505	70780	92977	90167	92794	108667	108267	105909	119812	127394
LESS: Amount Charged	0	0	0	0	0	0	0	0	0	0
PLUS: Am't Pd. on Acc't	0	0	0	0	0	0	0	0	0	0
CASH OPERATING EXPENSE	75505	70780	92977	90167	92794	108667	108267	105909	119812	127394

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

INCOME STATEMENT

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Operating Revenue	0	90357	115185	114771	121227	138907	144755	92221	114774	136566
+ End Product Inv.	68710	70470	89580	99893	124411	98085	63800	96789	122300	115134
- Beg.Product Inv.	0	68710	70470	89580	99893	124411	98085	63800	96789	122300
GROSS INCOME	68710	92117	134295	125084	145745	112581	110470	125210	140285	129400
Operating Expense	75505	70780	92977	90167	92794	108667	108267	105909	119812	127394
Depreciation	0	10184	11780	10249	10871	15976	22386	20482	17929	16810
+ Begin Supply Inv	0	6795	4249	6600	10286	8610	5000	9700	8100	5070
- End Supply Inv	6795	4249	6600	10286	8610	5000	9700	8100	5070	10500
TOTAL EXPENSE	68710	83510	102406	96730	105341	128253	125953	127991	140771	138774
NET INCOME	0	8607	31889	28354	40404	-15672	-15483	-2781	-486	-9374

TAX CALCULATION	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
NET OPERATING INCOME		27164	30230	33076	37382	39906	46790	-2747	6407	21172
less:										
Basic Exemption		2270	2430	2650	2890	3170	3560	3770	3960	3960
Married Exemption		1990	2130	2320	2530	2780	3110	3300	3470	3470
Dependent Children		860	920	1000	1080	1180	1340	1420	1420	1420
Standard Medical Deduction		100	100	100	100	100	100	100	0	0
CPP/UIC Contributions		302	338	382	425	479	536	601	677	677
Interest Income Deduction		1000	1000	1000	1000	1000	136	1000	0	0
C.C.A.		9752	15935	21042	11401	4061	32003	0	0	0
TAXABLE INCOME		10890	7377	4583	17956	27136	6005	-12938	-3120	11645
Federal Tax Payable		2008	1297	692	3441	5892	903	0	0	1927
less: Investment Tax Credits		2008	1297	692	3441	5892	903	0	0	1927
plus: Provincial Tax Payable		773	500	266	1325	2268	348	0	0	838
TOTAL TAX PAYABLE		773	500	266	1325	2268	348	0	0	838
NET AFTER-TAX INCOME		10117	6877	4316	16631	24867	5657	-12938	-3120	10807

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

BALANCE SHEET

	31/12/76	1977	1978	1979	1980	1981	1982	1983	1984	1985
ASSETS										
Current										
Cash	500	500	500	500	500	500	500	500	500	500
Investment Tax Credits	0	2008	1298	692	3442	5892	903	356	1251	3417
Supply Inventory	6795	4249	6600	10286	8610	5000	9700	8100	5070	10500
Crop Inventory	32100	28250	36900	57163	78000	43200	27000	30820	63280	58800
Livestock Inventory	36610	42220	52680	42730	46411	54885	36800	65969	59020	56334
Term Deposits/Investments	19500	14555	17735	29566	28936	983	21354	0	0	0
Total Current Assets	95505	91782	115712	140937	165899	110461	96257	105745	129121	129551
Fixed Assets at Market Value										
Machinery and Bldgs	174770	195327	209664	218855	240875	285556	295976	299860	311751	329928
Land	145000	174000	239000	245000	282000	377000	432000	367000	300000	300000
Other	0	0	0	0	0	0	0	0	0	0
Total Fixed Assets	319770	369327	448664	463855	522875	662556	727976	666860	611751	629928
TOTAL ASSETS	415275	461109	564376	604791	688774	773017	824234	772606	740873	759480
LIABILITIES										
Current	0	0	0	0	0	0	0	731	22493	44511
Term (Current Portion)	1957	2163	2391	2642	2919	3226	3564	3938	4351	0
Income Tax	0	2781	1797	958	4766	8161	1251	0	0	2765
Total Current Liab.	1957	4944	4188	3600	7685	11387	4815	4669	26844	47277
Term (Non-current)	205680	203517	201126	198484	195565	192339	188775	184837	180486	180486
TOTAL LIABILITY	207637	208461	205314	202084	203250	203726	193590	189506	207330	227763
OWNER EQUITY										
Beginning Equity	0	207638	252648	359062	402707	485525	569292	630644	583100	533543
Contributions	207638	0	0	0	0	0	0	0	0	0
Withdrawals	0	0	0	0	0	0	0	0	0	0
Income Taxes	0	2781	1797	958	4766	8161	1251	0	0	2765
Net Income	0	8607	31889	28354	40404	-15672	-15483	-2781	-486	-9374
Fixed Asset Adjustment	0	39184	75990	16249	36882	92857	76683	-44964	-49071	14904
Gain on Asset Disposal	0	0	332	0	10298	14743	1403	201	0	-4591
ENDING OWNER EQUITY	207638	252648	359062	402707	485525	569292	630644	583100	533543	531717
LIABILITY & OWNER EQUITY	415275	461109	564376	604791	688775	773017	824234	772606	740873	759480

ALTAFARM1 ASSETS AT MARKET VALUE SOLE PROPRIETOR 50% EQUITY

RATIO ANALYSIS

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Current Asset/Current Debt	48.80	18.57	27.63	39.15	21.59	9.70	19.99	22.65	4.81	2.74
Fixed Asset/Term Debt	1.55	1.81	2.23	2.34	2.67	3.44	3.86	3.61	3.39	3.49
Asset/Debt	2.00	2.21	2.75	2.99	3.39	3.79	4.26	4.08	3.57	3.33
Debt/Equity	0.00	1.00	0.81	0.56	0.50	0.42	0.34	0.30	0.36	0.43
Year Failure Occurs		0	0	0	0	0	0	0	0	0
Net Cash Flows	-207638	368	389	337	303	295	213	225	262	532099
Discount Rate	7.00%	9.00%	11.00%	13.00%	15.00%	17.00%	19.00%	21.00%	23.00%	25.00%
NPV After-tax Returns	78153	35843	1781	-25667	-47795	-65628	-79984	-91517	-100752	-108110
IRR After-tax Returns	11.12%									

IRR for Period From	1976 to 1977	21.85%	-207638	253016
	1977 to 1978	42.27%	-252648	359451
	1978 to 1979	12.25%	-359062	403044
	1979 to 1980	20.64%	-402707	485828
	1980 to 1981	17.31%	-485525	569587
	1981 to 1982	10.81%	-569292	630857
	1982 to 1983	-7.50%	-630644	583325
	1983 to 1984	-8.45%	-583100	533805
	1984 to 1985	-0.27%	-533543	532099
Average Annual Return		12.10%		
Standard Deviation		15.16%		

IRR for Period From	1976 to 1977	21.85%	-207638	253016							
	1976 to 1978	31.66%	-207638	368	359451						
	1976 to 1979	24.85%	-207638	368	389	403044					
	1976 to 1980	23.79%	-207638	368	389	337	485828				
	1976 to 1981	22.47%	-207638	368	389	337	303	569587			
	1976 to 1982	20.45%	-207638	368	389	337	303	295	630857		
	1976 to 1983	16.00%	-207638	368	389	337	303	295	213	583325	
	1976 to 1984	12.62%	-207638	368	389	337	303	295	213	225	533805
	1976 to 1985	11.12%	-207638	368	389	337	303	295	213	225	262	532099